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ACTUARIAL SOCIETY OF AMERICA.

"The work of science is to substitute facts for appearances and demonstrations for impressions."—RUSKIN.

Papers and Transactions.

1897—1898

With Index.

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CONTENTS.

	PAGE
Officers and Members	4–8
Notation	8
Corrigenda	8
Papers, April 29th, 1897	9–73
What Constitutes an Insurable Interest in Lives. Clayton C. Hall.	9
Meech's Life Table. Howell W. St. John	25
Cost of Insurance. James M. Craig	31
Level Premium Life Insurance—Historical Note. Joseph A. De Boer	49
Note Upon the Legal Ratio of 15½. (In Coinage of Silver.—Ed.) By M. Leon Walras, University of Lausanne, Switzerland. Translation by H. W. St. John	61
Government Legislation of Holland in Reference to the Working of Life Insurance Companies. Leonard Wolterbeek	67
President McClintock's Address	74
Discussion of Papers	82
International Congress of Actuaries, 1898	99
Abstract of Minutes	106
Members Present	106
Member Elected	107
Officers and Members of Council Elected	107
Vote of Thanks	108
Dinner	108
Papers, October 7th and 8th, 1897:	
The Tendency to National Supervision. E. P. Marshall	109
Note on a Particular Case of Loans Repayable by Instalments. John Tatlock, Jr	114
The Province of Equity in Life Insurance. Walter S. Nichols	117
Note on Premium Loading. Walter C. Wright	129
Problem of the Value of Money. (Leon Walras.) Rufus W. Weeks.	132
Cost of Insurance. M. W. Torrey	140
Johan De Witt. Ernst Willem Scott	147
Discussion of Papers	152
Abstract of Minutes	186
President Miller's Address	186
Members Present	191
Member Elected	191
Associates Admitted	192
Amendment to By-Laws	192
Second International Congress of Actuaries	192
Dinner	192
Vote of Thanks to Officers of Massachusetts Mutual Life Insurance Co.	193
Trip to Mount Tom	193
Death of James Martin-Dupray	194

PAPERS, APRIL 28TH AND 29TH, 1898:
The Limitations of the System of Net Valuations. Walter S. Nichols. 195
Provision for and Distribution of Expenses. William D. Whiting.. 214
The Ideal Life Insurance Company. John M. Holcombe..... ... 222
Select Life Tables as the Basis of Premium Rates. Thomas Bradshaw. 225
DISCUSSION OF PAPERS..... 239
CONSTITUTION AND BY-LAWS, AS AMENDED..... 270
ABSTRACT OF MINUTES, APRIL 28TH AND 29TH, 1898..... 274
PRESIDENT MILLER'S ADDRESS..... 274
MEMBERS PRESENT..... 276
ASSOCIATES ADMITTED..... 276
ELECTION OF OFFICERS AND MEMBERS OF COUNCIL..... 276
DELEGATES TO SECOND INTERNATIONAL CONGRESS OF ACTUARIES..... 277
INVITATION FOR FALL MEETING..... 277
AMENDMENT TO BY-LAWS ADOPTED. DUES OF FOREIGN MEMBERS.... 277
INVITATION TO CONGRESS OF ACTUARIES TO MEET IN NEW YORK..... 277
PROPOSED AMENDMENT TO CONSTITUTION. DATE OF ANNUAL MEETING. 277
CELEBRATION OF DECENNIAL OF THE SOCIETY..... 278
SHEPPARD HOMANS. MINUTE, ETC.....278, 280
HENRY W. SMITH. MINUTE, ETC..... 278, 282
DINNER..... 278
WAR RISKS..... 278, 279
PAPERS, OCTOBER 6TH AND 7TH, 1898:
General Principles. Emory McClintock..... 283
Individualism *vs.* Communism in the Conduct of a Life Insurance Company. Archibald A. Welch..... 300
An Equitable Method of Determining Paid-up or Cash Surrender Values. David Parks Fackler..... 303
Select Life Tables as the Basis of Premium Rates—Continued. Thomas Bradshaw..... 306
Modification of Mr. McClintock's Formula for an Approximation of Accumulated Contribution to Surplus. Gardner Ladd Plumley. 310
Market Value of $100 Government 3 per cent. Bond. Issue of August 1st, 1898. Tables. Samuel S. Hall..... 312
Valuation of Reversionary Annuities by C Columns. Maximilian H. Peiler..... 314
DISCUSSION OF PAPERS..... 318
CONSTITUTION AND BY-LAWS AS AMENDED OCTOBER 6TH, 1898..... 356
ABSTRACT OF MINUTES..... 360
PRESIDENT MILLER'S ADDRESS..... 360
MEMBERS PRESENT..... 364
CELEBRATION OF DECENNIAL OF THE SOCIETY..... 365
MEMBERS ELECTED..... 365
GEORGE ELLIS. MINUTE. PICTURE.....365, 375, 397
JOSEPH H. SPRAGUE. MINUTE. PICTURE.....365, 376, 399
GEORGE W. PHILLIPS. MINUTE. PICTURE.....365, 377, 401
AMENDMENT TO THE CONSTITUTION ADOPTED..... 366
EXAMINATIONS FOR ADMISSION TO MEMBERSHIP..... 366
DINNER..... 366
RESOLUTION OF THANKS TO OFFICERS OF STATE MUTUAL LIFE ASSURANCE CO..... 366
SECOND INTERNATIONAL CONGRESS OF ACTUARIES.....366, 367
MEMBERS WHO HAVE DIED. MINUTES AND PICTURES..... 379
INDEX TO VOL. V..... 415

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NOTATION.

ADOPTED OCTOBER 23D, 1890.

RESOLVED, that in the presentation of papers the Symbols of the Text-Book of the Institute of Actuaries, with the additions noted below, be followed when convenient, and that in any event the use of such symbols in other senses be avoided; that the letters denoting commutation columns, according to the system of Dr. Farr, customarily followed by American actuaries, be printed in plain "full-face" type; and that otherwise there be entire liberty as regards notation.

$k_x = \frac{d_x}{l_{x+1}} = \frac{C_x}{D_{x+1}}$.

$u_x = \frac{l_x}{l_{x+1}}(1+i) = \frac{D_x}{D_{x+1}}$.

S=Sum insured.

K=Cost of insurance=q $(S-V)$.

Π=Single premium (alternative for A).

CORRIGENDA.

Page	Line	For	Read
iii	8	April 9th	April 29th
88	Footnote	30	31
152	3	on	in
163	6	an	no
167	13	F	Mr.

VOL. V. NO. 17.

PAPERS AND TRANSACTIONS.

APRIL 29TH, 1897.

WHAT CONSTITUTES AN INSURABLE INTEREST IN LIVES.

CLAYTON C. HALL.

THE laws in force in the several States of the American Union in relation to that very important class of contracts known as contracts of insurance, are unfortunately very far from uniform. The diversity is to be found not only in the statutory enactments upon this subject, but also in the decisions of the Courts in different jurisdictions. At the meeting of the American Bar Association, held at Saratoga in August, 1896, one of the members, Hon. John A. Finch, of Indiana, speaking in favor of a motion to establish a separate Section for the consideration of Insurance Law, remarked, as illustrating the confusion on this subject, that "in the State of New York the State Courts would give the proceeds of a life policy to one party, while the Federal Courts would give the proceeds to another party. In the State Courts of New York there can be no recovery under a life policy under a given state of facts, while in the Federal Courts, under the same facts, the plaintiff would recover."

Upon the question as to what constitutes an insurable interest in lives, such as will sustain a title to a sum insured under a policy of life insurance, there have been conflicting decisions by Courts of high authority.

In the following pages an attempt is made to collate the leading cases and authorities upon this subject, and to deduce from the points of agreement, which must of necessity be found among decisions of Courts administering the same system of laws, and applying the same rules of interpretation, some general conclusions as to the existing law in the United States in relation to insurable interest in lives.

There is apparently no inherent reason why any person whatsoever should not have or obtain a beneficial interest in a contract of life insurance, as well as in any other form of lawful contract, made between competent parties. But in the matter of insurance upon lives, there has grown up a doctrine which restricts the class of persons who may be beneficiaries under an insurance upon the life of another person. This doctrine, or rule, is that the beneficiary must have what is called *an insurable interest* in the life insured; by which is meant, that in order to sustain a claim under a contract of insurance payable in the event of the death of a certain person, there must be shown, as a basis of such contract, some interest in the continuance of the life of that person. In the absence of such interest the contract has been held to be, on the part of the beneficiary, one of mere speculation or wager upon the duration of the life of the person insured.

In *Rittler* vs. *Smith* (70 Md., 263) it is said that "it is generally held by the Courts in this country that one who has no insurable interest in the life of another cannot insure that life. Such insurances are considered gambling contracts, and for that reason void at common law apart from any statute prohibiting them. In England they were held valid at common law, but were prohibited as introducing a mischievous kind of gaming."

The divergence of opinion between the American and English Courts being such as is here expressed, as to whether or not insurances upon lives, where no insurable interest existed, were in contravention of common law, a reference to the history of the doctrine of insurable interest, and the causes which led to its adoption, will help to a better understanding of the subject.

It is matter of common knowledge that the earlier half of the eighteenth century was a period of speculation of the wildest character. Companies were formed for all sorts of possible and impossible schemes. It seemed as though nothing were too preposterous to find acceptance as a basis of speculation. It was the era of the Mississippi scheme, and of the South Sea bubble. About this time the practice of making assurances upon lives took its rise, although it was not until the second half of the century that the business of life insurance became reduced to a system, through the recognition of a natural law of mortality, and the application thereto of established principles of mathematics and finance. This new project was immediately seized upon as affording new possibilities for speculation. "From the year 1720 much

of the legitimate business of the City of London was usurped by speculative or gambling assurances. Policies were opened on the lives of public men with a recklessness at once disgraceful and injurious to the morals of the country. That of Sir Robert Walpole was assured for many thousands ; and at particular periods of his career, when his person seemed endangered by popular tumults, as at the Excise Bill, or by party hate, as at the time of his threatened impeachment, the premium was proportionately enlarged. When George II. fought at Dettingen, 25 per cent. was paid against his return. The rebellion of 1745, as soon as the terror which it excited had passed away, was productive of an infamous amount of business. The members of Garraway's, the assurers at Lloyds', the merchants of the Royal Exchange, being unable to raise or lower the price of stocks any more by reports of the Pretender's movements, made sporting assurances on his adventures, and opened policies on his life. Sometimes the news arrived that he was taken prisoner, and the underwriters waxed grave. Sometimes it was rumored that he had escaped, and they grew gay again. Thousands were ventured on his whereabouts, and tens of thousands on his head. . . . The seals of a prime minister, or the life of a highwayman, answered equally the purpose of the policy mongers . . . if they could put money in their purses. There was absolutely nothing on which a policy could be opened that was not employed as the opportunity of gambling." (Francis, Annals of Life Assurance, p. 140 ; quoted in Bunyan on the Law of Life Assurance, p. 3, note.)

The evils and demoralization resulting from practices such as these are sufficiently obvious. When to whatever dangers might attend the life of a sovereign or a prime minister, arising from popular tumults or party hate, was added the possibility of others resulting from the greed and cupidity of those who had fortunes at stake upon his head ; when it was thought that there was to be feared not only the assassin who was such from political fanaticism, but also perhaps the murderer hired by those who cared only for private gain, it is not surprising that the subject received the attention of Parliament, and that a statute was enacted prohibiting speculative or gambling assurances upon lives. Accordingly, in 1774, an Act (14 Geo. III., cap. 48) was passed, entitled "An Act for regulating Insurances on Lives and for prohibiting all such Insurances, except in cases where the persons insuring shall have an interest in the life or death of the person insured," and enacting

that "Whereas it hath been found by experience that the making of insurances on lives or other events, wherein the assured shall have no interest, hath introduced a mischievous kind of gaming, . . . from and after the passing of this Act no insurance shall be made by any person or persons, bodies politic or corporate, on the life or lives of any person or persons, or on any event or events whatsoever, wherein the person or persons for whose use and benefit, or on whose account such policies shall be made, shall have no interest, or by way of gaming or wagering; and every insurance made contrary to the true intent and meaning hereof, shall be null and void to all intents and purposes"; and further enacting "that in all cases where the insured hath interest in such life or lives, event or events, no greater sum shall be recovered or received from the insurer or insurers than the amount or value of the interest of the insured in such life or lives, or other event or events."

This Act was evidently framed upon the model of one passed during the preceding reign, in relation to a different, though analogous subject. The practice of making insurances upon marine risks—upon ships and cargoes—was customary long before the business of making insurances upon lives was introduced. Speculators were prompt to recognize the possibilities for speculative gain offered by policies of marine insurance, which they availed of by taking out insurances upon ships and cargoes in which they had no pecuniary interest, looking to the loss of the ship as their opportunity for profit. The temptation under these circumstances to bribe the sailing-master to cast away the ship, or otherwise bring about a fraudulent loss, is sufficiently apparent. To correct the evil resulting from this practice, the Statute 19 George II., cap. 37, was passed (in 1746), which provided "that whereas it hath been found by experience that the making insurance, interest or no interest, or without further proof of interest than the policy, hath been productive of many pernicious practices, whereby great numbers of ships, with their cargoes, have either been fraudulently lost or destroyed or taken by the enemy in time of war . . . and by introducing a mischievous kind of gaming or wagering under pretence of assuring the risque on shipping and fair trade, the institution and laudable design of making assurances hath been perverted" . . . therefore it was enacted "that from and after the first day of August, 1746, no assurance or assurances shall be made by any person or persons, bodies corporate or politick,

upon any ship or ships belonging to his Majesty, or any of his subjects, or on any goods, merchandizes or effects laden or to be laden on board of any such ship or ships, interest or no interest, or without further proof of interest than the policy, or by way of gaming or wagering, without benefit of salvage to the insurer, and that every such assurance shall be null and void to all intents and purposes."

It is from the Act of 14 Geo. III., cap. 48, commonly called the Gambling Act, that the doctrine of insurable interest in lives takes its origin; and in the decisions of the Courts made in enforcement of its provisions, or in pursuance of its policy, the interpretation of that doctrine is to be sought.

The English decisions, both before and after the passage of the Act, abundantly show that contracts, the performance of which was conditioned upon the continuance or termination of life, were not considered as void at common law by reason of the absence of insurable interest, even though they were of the nature of wagers.

In 1771, in the case of *March* vs. *Pigot* (5 Burr., 2803), Lord Mansfield sustained the claim under a wager between two young gentlemen, the subject of the bet being which of their respective fathers would die first, remarking that "there was no suggestion that it was illegal on the ground of public policy."

In *Gilbert* vs. *Sykes* (16 East, 155), where the wager depended upon the duration of the life of Napoleon Bonaparte, and grew out of a conversation in respect to the probability of his *assassination*, Lord Ellenborough held that though an action on a wager may be entertained without parties having a special interest in the subject-matter, this rule would not hold against an objection taken on the ground of public policy. "It is," he said, "no new principle in law that if a contract have a tendency to a mischievous and pernicious consequence it is void"; and the wager in this case was so declared as being "against public policy and of immoral tendency."

And in *Dalby* vs. *Insurance Company* (15 C. B., 365), Parke, B., declared, "at common law before the statute (19 Geo. II., c. 37), with respect to maritime risks, and the 14 Geo. III., c. 48, as to insurances upon lives, it is perfectly clear that all contracts for wager policies and wagers which were not contrary to the policy of the law, were legal contracts."

But this view appears perhaps more strongly still from the language of the statute itself—that making insurances upon lives

in which the assured shall have no interest, having "been found by experience to have introduced a mischievous kind of gaming . . . *from and after the passing* of this Act, no insurance shall be made in which the insured shall have no interest"; clearly indicating that that which was previously legal was thenceforth prohibited. (Bunyan on the Law of Life Assurance. p. 11.)

In *Warnock* vs. *Davis* (104 U. S., 775), Justice Field, delivering the opinion of the Court, said, "Otherwise (i. e., unless there be an insurable interest) the contract is a mere wager, by which the party taking the policy is directly interested in the early death of the assured. Such policies have a tendency to create a desire for the event. They are, therefore, independently of any statute on the subject, condemned as being against public policy."

In *Rittler* vs. *Smith* (70 Md., 261), the Court said that the force of the suggestion that such contracts are incentives to crime may well be doubted. "This doctrine," the opinion continues, "carried to its logical result, has a far-reaching effect. It strikes down every legacy to a stranger which may become known to the legatee, as is frequently the case, before the death of the testator. It makes void every similar limitation in remainder after the death of a life tenant. . . . Yet we know of no case in which a Court has declared such testamentary dispositions or conveyances to be void on this ground."

The same view was expressed by Lord Ellenborough in *Gilbert* vs. *Sykes* (16 East, 155): "It cannot indeed be considered that any person, by means of an interest created in the duration of another's life, would be impelled to commit murder in this country from the fear of the law, if from no other fear." And it is to be noted that while in the preamble to the Act of 19 Geo. II., in relation to wager policies on marine risks, it is declared to have been found by experience that as a result of this pernicious practice "great numbers of ships with their cargoes have been fraudulently lost and destroyed," in the preamble to the Act of 14 Geo. III., prohibiting wager policies on lives, no corresponding allegation is made. They are simply declared to have given rise to a "mischievous kind of gaming."

But the well-known case of Udderzook (*Udderzook* vs. *Commonwealth*, 76 Penna. St., 340), while it involved no question of insurable interest, demonstrates that speculation in insurance upon lives may prove the occasion of crime. In this case the life of one Goss was insured for $25,000 for the benefit of his wife, and Goss

and Udderzook (who was his brother-in-law) entered into a conspiracy to defraud the insurance companies. On February 2d, 1872, the workshop of Goss, on the York Road, near Baltimore, was burned, and a dead body produced from the ruins was alleged to be that of Goss. The insurance companies denied the identity and resisted the claim for the insurance. Goss, under the *alias* of Wilson, remained in hiding until July 1, 1873, when, pending the trial of the suits with the insurance companies, Udderzook, to prevent his discovery, murdered him in Chester County, Pa., and concealed the body in some woods. For this crime Udderzook was tried, convicted and hanged.

The conclusion to be drawn seems to be that at common law insurances upon lives were not void for lack of insurable interest in the beneficiary; and that the objection that such insurances would operate as incentives to crime, while not wholly negligible, may be considered as of doubtful force. In England the prohibition upon such contracts is statutory; and in this country, at least in those jurisdictions in which there is no statute upon the subject, they have been pronounced invalid by the Courts upon grounds of public policy, the decisions being influenced, no doubt, by the reason assigned in its preamble for the passage of the English statute, that they give rise to a "mischievous kind of gaming," and by "the general rule in America, independently of any statute, that a wagering contract is illegal and void as being against public policy." (Brantly on Contracts, p. 134.)

In the case of *Insurance Company* vs. *Schaefer* (94 U. S., 457), Justice Bradley, delivering the opinion of the Court, remarked in respect to the rule that a wagering contract is void as being against public policy, that though a contrary view was held later, "this was the law of England prior to the revolution of 1688. In this country . . . the older common law has been followed." During the period here assigned for the prevalence of this rule in England, its application to contracts involving the question of insurable interest in lives could not have been considered, as the practice of making insurances upon lives had not then been developed.

In the earlier applications of the doctrine of insurable interest in lives there was a failure to recognize the radical difference between a contract of life insurance and one of marine or fire insurance, and it was long before the confusion of ideas hence resulting was corrected.

The purpose of the Statute 19 Geo. II., in relation to maritime

risks, was to limit recovery under a marine policy to the loss actually sustained and proved, the contract being one of indemnity. A policy of fire or marine insurance is strictly a contract of indemnity. The insured house may or may not burn. The insured ship may be wrecked or it may not; and the loss, if any, is to be borne by the insurer. But a policy of life insurance is a contract to pay a sum of money upon the happening of an event which is sure to happen. The insured life will inevitably be terminated by death. The time of its termination is alone uncertain.

In the case of *Godsall* vs. *Boldero* (9 East, 72), decided in 1803, which for many years was the leading case on the subject, and which derived great weight from the eminence of the Judge (Lord Ellenborough) who rendered the decision, an entirely erroneous principle was adopted. This case related to an insurance on the life of William Pitt, made to provide for the payment of a debt due by him to a carriage maker. His debts, including the one protected in part by this insurance, were paid after his death with money appropriated by Parliament for this purpose. In an action to recover the insurance money, counsel for the defence followed throughout in argument a supposed analogy with marine insurance, and compared the payment by Parliament to "salvage," to the benefit of which the assurers were entitled. Lord Ellenborough, adopting this view, decided that their liability had been extinguished, broadly stating that "this insurance, as every other to which the law gives effect . . . is in its nature a contract of indemnity, as distinguished from a contract of gaming or wagering"; and in support of this view he quoted Lord Mansfield in *Hamilton* vs. *Mendes* (2 Burr., 1270), which was a case of *marine* insurance.

This decision remained the authoritative declaration of the law for more than half a century, until it was completely overruled by the decision, in 1854, in the case of *Dalby* vs. *Insurance Co.* (15 C. B., 365). This case arose out of a policy of insurance on the life of the Duke of Cambridge, issued by one insurance company to another by way of reinsurance, and where the insurance was claimed on behalf of the reinsured company, although its own policies on the life of the Duke were no longer in force. In rendering his decision, the Judge (Parke, B.) declared that "this species of insurance in no way resembles a contract of indemnity"; and after carefully reviewing the language of the Statute 14 Geo. III., the Court held that as an insurable interest existed at the time

the policy was effected, it was not made in contravention of the Statute, and the subsequent extinction of that interest did not relieve the insurers from their liability. The principle upon which *Godsall* vs. *Boldero* was decided was overruled in terms, and the theory upon which it was based was thenceforth disposed of as unsound.

The theory of indemnity having been finally abandoned, it remains to consider what constitutes an insurable interest in lives in the light of modern decisions. Under the terms of the Act in which the doctrine originated, it was required that the interest, to support an insurance, must be pecuniary; no ties of blood or affection were sufficient. To this general rule it was formerly considered that there was one exception, namely, that a married woman had, at common law, an insurable interest in the life of her husband. (Bunyan on the Law of Life Assurance, p. 14, and authorities there cited.)

But the rigor of the former rule has in course of time become greatly modified. "The tendency of modern decisions is to relax the stringency of the earlier cases, and to admit to the protection of the contract whatever act, event or property bears such a relation to the person seeking insurance that it can be said with a reasonable degree of probability to have a bearing upon his prospective pecuniary condition." (May on Insurance, sec. 76.) At the same time, the decisions in cases involving the question of insurable interest have been neither so definite as to principle, nor consistent with one another, as to have altogether relieved the subject of difficulty. "The question what is such an interest in the life of another as will support a contract of insurance upon the life, is one to which a complete and satisfactory answer resting upon sound principles can hardly be said to have been given." (May on Insurance, sec. 107*a*). In the opinions of Courts in several leading cases, attempts have been made to define what constitutes an insurable interest. In *Warnock* vs. *Davis* (104 U. S., 775) Justice Field, delivering the opinion of the Court, said: "It is not easy to define with precision what will in all cases constitute an insurable interest, so as to take the case out of the class of wager policies. It may be stated generally, however, to be such an interest, arising from the relationship of the party obtaining the insurance, either as creditor of, or surety for the assured, or from the ties of blood or marriage to him, as will justify a reasonable expectation of advantage or benefit from the continuance of his life. It is not

necessary that the expectation of advantage or benefit should be always of pecuniary estimation."

In the case of *Insurance Company* vs. *Bailey* (13 Wallace, 616) it was held that "it is sufficient to show that the policy is not invalid as a wager policy, if it appears that the relation, whether of consanguinity or of affinity, was such between the person whose life was insured and the beneficiary named in the policy, as warrants the conclusion that the beneficiary had an interest, either pecuniary or arising from dependence or natural affection, in the life of the person insured."

To the same effect was the opinion of Shaw, C. J., in *Loomis* vs. *Eagle Company* (6 Gray, Mass., 396): "All, therefore, which it seems necessary to show in order to take the case out of the objection of being a wager policy, is that the insured has some interest in the life of the *cestui que vie;* that his temporal affairs, his just hopes and well-grounded expectations of support and advantage in life, will be impaired; so that the real purpose is not a wager, but to secure such advantages supposed to depend on the life of another. Such we suppose would be sufficient to prevent it from being regarded as a mere wager." "Perhaps," the opinion continues, "it would be difficult to lay down any general rule as to the nature and amount of interest which the assured must have." (Cf. *Insurance Company* vs. *Schaefer*, 94 U. S., 457.)

In an attempt to classify the several grounds upon which an insurable interest may rest, "a convenient, though perhaps hardly substantial, distinction may be made between an insurable interest that is accompanied with family relationship, and an insurable interest not so accompanied." (Cooke on Life Insurance, p. 94.)

In respect to an insurable interest that is accompanied with family relationship, it does not appear that the mere fact of consanguinity or affinity is recognized as sufficient to support such an interest, unless it be of so close a nature as to constitute in law a "good," as distinguished from a "valuable" consideration for any gift or grant. Otherwise, there must in addition be some evidence, conclusive or presumptive, of an interest of a pecuniary nature, present or prospective, or of some advantage, at least probable, to be derived from the continuance of the life in which such interest is asserted. But, with this proviso, it may be said that where the relationship exists, a very moderate degree of evidence as to the existence of an actual, or probable, pecuniary interest will gener-

ally be held sufficient to support a claim to an insurable interest.

As already remarked, it has long been held that a married woman had at common law an insurable interest in the life of her husband. But this subject has now been largely regulated in this country by statutes in relation to insurances for the benefit of married women upon the lives of their husbands, the primary object of such statutes being generally the protection of such insurances from the claims of creditors of the husband; but through them all the married woman's insurable interest in the life of her husband is assumed. (Cf. *Bank* vs. *Hume*, 128 U. S., 195.)

Similar statutes have within recent years been enacted in England. (Cf. 45 and 46 Vict., c. 75.)

The insurable interest of a married woman in the life of her husband follows conclusively from his legal obligation to provide her with a support. In the case of *Insurance Co.* vs. *Schaefer* (94 U. S., 457) the wife's claim was sustained even after divorce, the Court applying the rule that "a life policy, originally valid, does not cease to be so by the cessation of the assured party's interest in the life insured." So a minor child has such an interest in the life of his father; and a father in the life of his minor child, to whose services and earnings he is entitled. It has also been held that a husband has such an interest in his wife's life; and a sister in that of a brother who contributed to her support; and a woman to have such an interest in the life of a man who was engaged to be married to her. But the relationship of brother and sister was held sufficient in *Ætna Co.* vs. *Francis* (94 U. S., 561) to sustain the contract without evidence of pecuniary interest. The Court in this case laid down the broad rule that "when the relationship between the parties, as in this case, is such as to constitute a good and valid consideration in law for any gift or grant, the transaction is entirely free from the imputation" of being a cover for a wagering policy.

On the other hand, it has been held that in the absence of any pecuniary or other beneficial interest in the life insured, a nephew has no insurable interest, because of relationship, in the life of his aunt; or an uncle in the life of his nephew; or an adult son in that of his father; or a stepson in that of his stepfather; or a son-in-law in that of his mother-in-law; or a daughter in that of her mother; or a granddaughter in that of her grandfather. (Cooke on Life Insurance, pp. 96–98, and the cases there cited.)

In respect to an insurable interest which is not accompanied by family relationship, a distinction is to be drawn between (1) insurances effected directly by the beneficiary named in the policy, and (2) those in which the claim is derived from an assignment of interest. It is recognized that a creditor has an insurable interest in the life of his debtor, as the death of the latter is considered as diminishing the chances for the payment of the debt, even though the debtor be hopelessly insolvent. As to the amount of insurance that the creditor's claim will support since the abandonment of the theory of mere indemnity, there has been much conflict of opinion. If the disproportion between the amount of the insurance and the pecuniary interest—including the original debt, together with advances made in payment of premiums, and interest on both—is so great as to give to the transaction the appearance of a wager, the Courts will not sustain the title of the creditor to the insurance, beyond the amount of his pecuniary interest as above defined; but if the disproportion is not excessive, the Courts will sustain the contract, in view of the risks which the creditor assumes, owing to the uncertainty as to the amount which he will have to pay out in premiums, the time at which he will receive reimbursement, and the solvency of the insurer.

In *Cammack* vs. *Lewis* (15 Wallace, 643), where insurance to the amount of $3,000 was taken and assigned for a debt of $70, the insured was in bad health when the policy was obtained, and died within a year after its issue, and the Court held that under the circumstances "it was a sheer wagering policy, and probably a fraud on the insurance company."

But in *Rittler* vs. *Smith* (70 Md., 261), where the insurance was with certain assessment companies in the nominal sum of $6,500, upon which the amount of $2,124.82 was actually collected, while the debt, including disbursements for premiums, and interest on the debt and advances, amounted to about three-fourths of that sum, the Court held that in the absence of evidence tending to show a wagering contract, a *bona fide* assignee for value was entitled to recover the whole amount of the insurance, and hold the same for his own use, and that the same rule applies to the creditor who seeks in this manner to secure the payment of his debt; and that while "there may be such a gross disproportion between the debt and the amount of the policy as to stamp the transaction as indicating upon its face want of good faith, and as a mere speculation or wager," . . . "we cannot say the disproportion between

the debt and the real amount and value of the insurances is so great in this case as to warrant a sentence of condemnation against the transaction as being a mere speculation or wager on the life of the debtor." The claim of the creditor to the whole amount of the insurance was, therefore, sustained.

It has also been held that a surety has an insurable interest in the life of his principal; and one of two joint obligors may have such an interest in the life of the other. And other instances, of similar character, where the pecuniary interest in the life of another is contingent, or undetermined, as in the case of a co-partner, might be cited as giving support to a claim to insurable interest. (Bunyan on the Law of Life Assurance, pp. 21, 22; *Insurance Co.* vs. *Luchs*, 108 U. S., 498.)

It is clearly settled that every man has an interest in his own life to any amount at which he may choose to value it, and may insure it accordingly. (*Loomis* vs. *Eagle Co.*, 6 Gray, Mass., 399.)

The question next arises, under what circumstances, and to what extent, can a person who has a legitimate insurable interest in a contract of insurance, whether on his own life or on that of another, make a valid transfer of that interest by assignment to a third person, a stranger to the original contract?

In England it seems to be settled law that it is not necessary that the insurable interest and the beneficial ownership of the policy should remain in the same person, but an assignee, possessing no such interest, will be entitled, as the purchaser of the policy, to bring an action upon it, in the name of the assured, and will be protected by the insurable interest of his vendor. (Bunyan on the Law of Life Assurance, p. 29.) The right, however, of a person to effect insurance to any extent upon his own life cannot be made a means of evading the statute, so as to enable a person who is without an insurable interest, to effect an insurance on the life of another, and thus obtain the benefit of the policy by assignment. In Ireland, in the case of *Scott* vs. *Roose* (Long and Town, Ir. Rep., 54), where the statute did not at the time apply (its application did not extend to that portion of the United Kingdom until 1866), it was held incumbent upon the claimant to show that the assignment was one which he was entitled to uphold in a Court of Equity. (Bunyan on the Law of Life Assurance, pp. 25, 26.)

Broad ground has been taken by the New York Court of Appeals as to the assignable character of the interest in policies of life insurance, and the validity of the title thus acquired. In *St. John*

vs. *Insurance Co.* (13 N. Y., 31), the Court held that "policies of insurance are *choses in action;* they are governed by the same principles applicable to other agreements involving pecuniary obligations." And in *Valton* vs. *Insurance Co.* (20 N. Y., 32), "that if Martin and Valton, or either of them, procured and paid for the policy (on the life of Schumacher, said to be their partner in business) for their or either of their benefit, though with the assent of Schumacher, then the policy was void, being a wager policy (under Special Statute, 1 R. S. 662). If he (Schumacher) so obtained it, he had the right to dispose of it as he saw fit, and it would be no defence against his assignees that they had no insurable interest."

In the case of *Olmsted* vs. *Keyes* (85 N. Y., 599) it was declared that "it is abundantly settled in this State that one who takes an insurance upon his own life may make the policy payable to any person whom he may name in the policy, and that such person need have no interest in the life insured." This conclusion follows almost of necessity from the fact that every person is admitted to have an insurable interest in his own life. Any one effecting such an insurance would unquestionably have a right to make testamentary disposition of the sum insured, and should be equally unrestricted in disposing of it by the voluntary designation of a beneficiary, provided always, as in the case of assignments, that such designation be not a mere cloak for a wagering contract on the part of the beneficiary. (Cf. Cooke on Life Insurance, p. 94, note.)

The doctrine on the subject is stated in Bliss on Life Insurance (sec. 30) as follows:

"It is now settled that if there is any insurable interest, so as to make the policy valid at the time of its issue, it will, in the absence of a stipulation to the contrary, remain valid, no matter what may subsequently occur to change the amount of interest, or even terminate it entirely. If obtained by one having at the time an insurable interest, it may be assigned to one who has not and never had any interest in the life insured. If obtained as security for debt, it remains valid for the full amount after the debt is paid, so that the creditor may really be paid twice." (Cf. *Rittler* vs. *Smith*, 70 Md., 265.)

But the Supreme Court of the United States has been more reserved upon this subject. In *Warnock* vs. *Davis* (104 U. S., 782) the Court held that the same ground which invalidates a policy

taken out by a party who has no interest in the life of the assured, should invalidate an assignment of such a policy to a party who has no such interest, "so far, at least, as to restrict the right of the assignee to the sums actually advanced by him. In the conflict of decisions on this subject, we are free to follow those which seem more fully in accord with the general policy of the law against speculative contracts upon human life."

In *Ritter* vs. *Smith* (70 Md., 265), a case to which reference has already been made, a carefully discriminating opinion upon this subject was given by the Court of Appeals of Maryland. "It is settled law in this State," said Judge Miller, delivering the opinion of the Court, "that a life insurance policy is but a *chose in action* for the payment of money, and may be assigned as such under our Act of 1829, cap. 51. . . . Such an assignment is valid in this State if it be a *bona fide* business transaction, and not a mere device to cover a gaming contract." And after remarking that there might be circumstances such as would stamp the transaction as indicating upon its face want of good faith, and as a mere speculation or wager, the Judge added: "No general rule on this subject has as yet been laid down by the Courts, and it is probably better to leave each case to depend upon its own circumstances." (Cf. *Hewlett et al.* vs. *Home for Incurables*, 74 Md., 350.)

In *Souder* vs. *Home Friendly Society* (72 Md., 511) the validity of the claim was sustained under an assignment made in good faith by an assignee of a policy, who had a creditor's interest in the life insured, to a third person who had no such interest.

A policy of life insurance may also be assigned by way of mortgage, or pledge, or otherwise, as security; and an assignment absolute on its face may be shown by parole to have been given simply as security, and its operation will be, in Equity, correspondingly limited. (*Matthews* vs. *Sheehan*, 69 N. Y., 585; *Page* vs. *Burnstine*, 102 U. S., 664; cf. also *King* vs. *Van Vleck*, 109 N. Y., 363; *Crotty* vs. *Insurance Co.*, 144 U. S., 621.)

To sum up as briefly as possible the principal conclusions to be drawn from the foregoing review of the subject of insurable interest in lives, it may be said:

1. That an insurance effected by a stranger upon the life of another, simply by way of speculation or wager, will not be sustained by the Courts.

2. That certain relationships of consanguinity or affinity afford

conclusive evidence of insurable interest ; such as the interest of a wife in the life of her husband.

3. That other and less degrees of relationship afford a presumption of insurable interest, and will be deemed sufficient if sustained by some proof of interest (even though slight), either pecuniary, or of probable advantage other than pecuniary, in the life insured.

4. That in the absence of any family relationship, the evidence must be distinct of some pecuniary interest on the part of the beneficiary, or of some present or prospective advantage dependent upon the life of the person whose life is insured.

5. That a creditor has an insurable interest in the life of his debtor, and may recover and hold to his own use the full amount of the insurance *bona fide* procured for the protection of his debt ; and that the subsequent payment of the debt does not invalidate an insurance valid at the time of its inception.

6. That every person has an insurable interest in his own life to such amount as he may choose to value it ; and that a valid title to a contract of insurance can be given by one who has an insurable interest in the life insured, to a stranger without such interest, by assignment of the policy, as of any *chose in action*, provided the assignment be a *bona fide* business transaction, and not a mere cover for a gambling venture.

7. That an assignment of a policy of life insurance, to give title, must be such as could be sustained in a Court of Equity ; and if, though absolute upon its face, it be shown to have been in fact made by way of pledge, or mortgage, as security for debt, it will be dealt with by the Courts according to the true intention of the parties.

Meech's Life Table.

HOWELL W. ST. JOHN.

THE calculations, an epitome of which is given in this article, were made several years ago for the purpose of testing Meech's Life Table, with a view to employing it as a basis of the premiums and net values of special forms of non-participating insurance—long term, coupled with endowments and annuities. The fundamental design was a selection that should represent as accurately as possible, by a single series, the mortality of American insured lives.

Two objections deserving notice are made against the practical value of the Meech Table: first, the heterogeneous nature of the observations upon which it is founded, resulting from the inclusion of material contributed by several moribund companies; and, second, the immaturity of the greater portion of the experience of the Thirty American Companies. Manifestly these opinions are discordant, and relate to two conditions opposite in character, that tend to neutralize each other. Nearly all the material contributed by the companies termed "moribund" was included in the facts of the first seven or eight years of insurance; hence it is an obvious inference, that the consequent mortality rates of the general table would be *relatively* high in that portion of the series pertaining to the usual "ages at entry"—*i. e.*, compared with a scale resulting from a mass of observations more nearly homogeneous. This opinion is confirmed by an examination of the well-adjusted mortality rates constructed by the late Prof. C. F. McCay, from the *elementary facts* of the experience of the Thirty American Companies—published in the *Spectator* (New York City), of July 19th, 1888.

In respect of the second objection it may be said, that the unique method (termed Final Series by its author) employed to lend maturity to the facts of the earlier years of insurance has proved successful; to what extent the appended tables may serve to illustrate. If from the total "experience" (of the Thirty Companies) the first five years of insurance (0, 1, 2, 3 and 4) be excluded, the greater portion of the hotch-potch material will be rejected; the remainder may without serious error be assumed to represent normal conditions obtaining after the earlier effects of medical selection have been eliminated.

The five tables appended to this note refer to that portion of the observations above mentioned; they contain the "tabular," and corresponding actual losses* included therein (the former were derived from the graduated mortality rates of Meech's Life Table), arranged in groups of quinquennial years of insurance and attained ages, from 15 to 80 inclusive—and the resulting numerical ratios.

Prolonged discussion would create the impression that the subject of this note is regarded as of great importance; nevertheless a brief reference to one or two other tests of the Meech Life Table may prove of passing interest. The graphic illustrations (following the tables) delineate facts that are worthy of confidence, as they were derived from an "experience" of 33 years' duration, and included for each year of the term an average "exposed to risk" of about one hundred millions, and an aggregate of losses of between nineteen and twenty millions of dollars. The observations included life, endowment and term insurance. The headings of the "graph" supply all needed explanations.

Another test of the Meech Table, applied to statistics of *whole-life insurance only*, yielded the following facts: ratio of actual to tabular losses of the first five years (0–4 inclusive) 66 per cent.; sixth and subsequent years (5–33 inclusive) 98 per cent.; *all* years of insurance 96 per cent.—based upon about one-half the aggregate death-claims (and corresponding "exposed to risk") mentioned in the preceding paragraph.

A comparison was made of the mortality rates of the Meech Table and those prepared by Mr. Miller from the experience of the Mutual Benefit Life Insurance Company, *excluding the first 15 years of insurance.* The mass of observations to which the rates were applied was composed of about two and a quarter million "years of life" arranged in the series of actual experience, that extended through a period of 34 years. The total number of actual deaths was 22,937; total tabular deaths by the Meech Table, 26,543; by the Mutual Benefit Table, 24,906.

One further remark may be pertinent here. The mortality of the Thirty Companies was not disturbed by the adverse selection resulting from the payment of published cash-surrender-values. How far the future mortality of American insured life may be modified by the present practice of converting reserves into savings-bank deposits, is a question to be duly considered when forming a judgment respecting existing life tables.

* Based upon amounts insured.

These comments and addenda are by no means to be considered polemic; they are presented with the hope that they may be regarded as an acceptable contribution in harmony with the apothegm adopted as the motto of our Association . . . "substitute facts for appearances, and demonstrations for impressions."

I.—Years (5 to 9) inclusive.

Tabular Losses by Meech's Mortality Table.
Actual Losses from Experience 30 American Companies.

Ages.	Tabular Losses.	Actual Losses.	Ratios.
15–19	13.013	9	65 per cent.
20–24	122.275	155	127 "
25–29	952.112	1,173	123 "
30–34	2,989.717	3,423	114 "
35–39	4,919.095	5,412	110 "
40–44	5,877.175	6,309	107 "
45–49	6,019.074	5,929	99 "
50–54	5,555.137	5,209	94 "
55–59	4,142.558	4,206	102 "
60–64	2,703.894	2,772	102 "
65–69	1,361.757	1,224	90 "
70–74	398.190	372	93 "
75–80	75.955	65	86 "
Totals,	35,129.962	36,258	$103\frac{21}{100}$ "

II.—Years (10 to 14) inclusive.

Tabular Losses by Meech's Mortality Table.
Actual Losses from Experience 30 American Companies.

Ages.	Tabular Losses.	Actual Losses.	Ratios.
15–19	.477		
20–24	2.712	7	258 per cent.
25–29	20.498	26	124 "
30–34	205.666	310	151 "
35–39	819.043	867	106 "
40–44	1,467.659	1,487	101 "
45–49	1,779.131	1,900	107 "
50–54	1,763.423	1,616	92 "
55–59	1,498.413	1,361	91 "
60–64	1,047.841	899	86 "
65–69	630.218	544	86 "
70–74	280.542	229	82 "
75–80	88.653	84	94 "
Totals,	9,604.276	9,330	$97\frac{15}{100}$ "

III.—Years (15 to 19) inclusive.

Tabular Losses by Meech's Mortality Table.
Actual Losses from Experience 30 American Companies.

Ages.	Tabular Losses.	Actual Losses.	Ratios.
15–19	.031		
20–24	.159		
25–29	1.450	1	69 per cent.
30–34	9.616	19	198 "
35–39	90.820	84	92 "
40–44	399.020	392	98 "
45–49	804.258	792	99 "
50–54	1,026.929	931	91 "
55–59	997.820	939	94 "
60–64	888.811	834	94 "
65–69	589.152	592	101 "
70–74	308.611	238	77 "
75–80	168.473	124	74 "
Totals,	5,285.150	4,946	$93\frac{59}{100}$ "

IV.—Years (20 to 39) inclusive.

Tabular Losses by Meech's Mortality Table.

Actual Losses from Experience 30 American Companies.

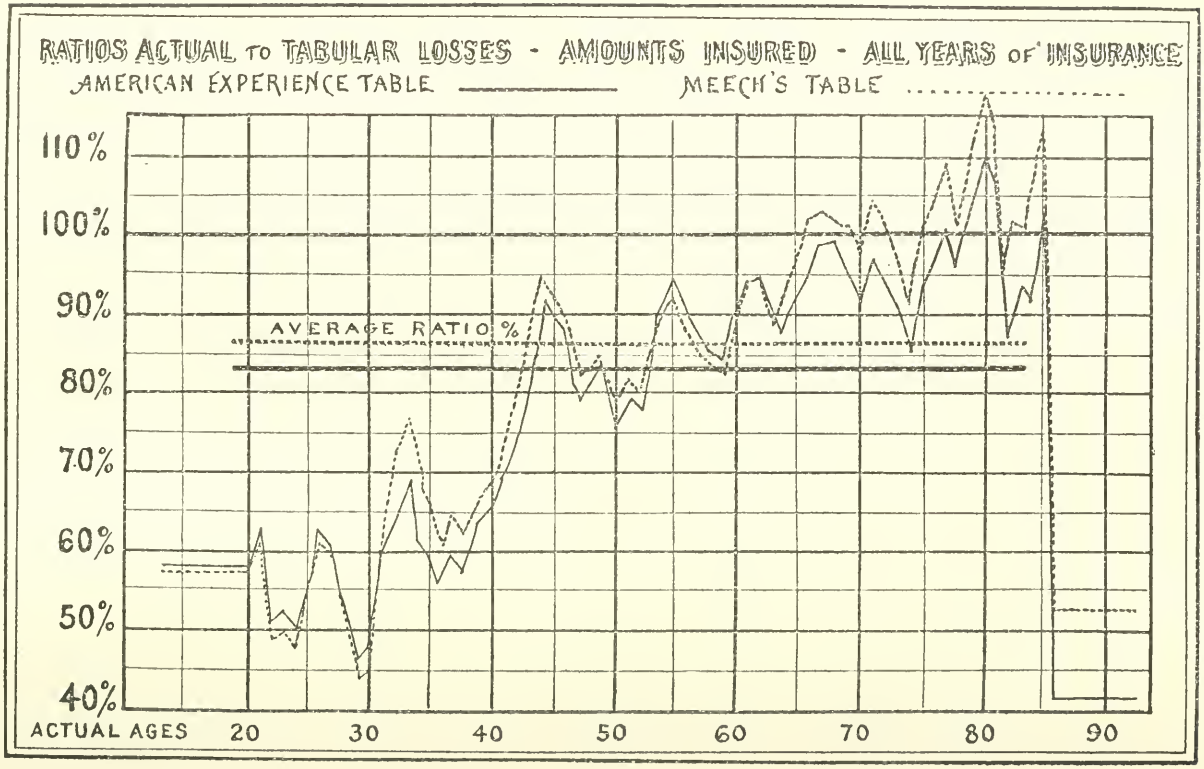
Ages.	Tabular Losses.	Actual Losses.	Ratios.
15–19			
20–24	.010		
25–29	.102		
30–34	1.079	2	139 per cent.
35–39	6.090	14	230 "
40–44	46.814	74	158 "
45–49	261.115	225	96 "
50–54	660.267	690	105 "
55–59	970.454	856	88 "
60–64	1,064.767	1,084	102 "
65–69	888.774	1,042	117 "
70–74	545.274	522	96 "
75–80	339.388	264	78 "
Totals,	4,784.134	4,773	$99\frac{78}{100}$ "

V.—Years (5 to 39) inclusive.

Tabular Losses by Meech's Mortality Table.

Actual Losses from Experience 30 American Companies.

Ages.	Tabular Losses.	Actual Losses.	Ratios.
15–19	13.521	9	63 per cent.
20–24	125.156	162	129 "
25–29	974.162	1,200	123 "
30–34	3,206.078	3,754	117 "
35–39	5,835.048	6,377	109 "
40–44	7,790.668	8,262	106 "
45–49	8,863.578	8,846	100 "
50–54	9,005.756	8,446	94 "
55–59	7,609.245	7,362	97 "
60–64	5,705.313	5,589	98 "
65–69	3,469.901	3,402	98 "
70–74	1,532.617	1,361	89 "
75–80	672.469	537	80 "
Totals,	54,803.512	55,307	$100\frac{92}{100}$ "


RATIOS ACTUAL TO TABULAR LOSSES - AMOUNTS INSURED - ALL YEARS OF INSURANCE
AMERICAN EXPERIENCE TABLE
MEECH'S TABLE
110%
100%
90%
80%
70%
60%
50%
40%
AVERAGE RATIO %
ACTUAL AGES
20
30
40
50
60
70
80
90

Cost of Insurance.

JAMES M. CRAIG.

THE reserve on any policy has for so long a time, and without question, been considered an element in determining the cost of insurance, it was not surprising that the paper presented before this Society in 1891 by Mr. Homans on "Insurance Values as Bases for Surrender Charges" did not receive any kind of support or sanction.

The paper presented by him at our last meeting, on "Insurance Values and Surrender Charges," brings the subject up again for discussion, and I beg your indulgence while I speak more particularly on that part of it relating to Insurance Values.

It is my firm conviction that: (1) The reserve on the pure endowment part of any insurance contract does not modify the cost of insurance; (2) The reserve on any form of contract can properly be construed as a pure endowment and, therefore, does not modify the cost of insurance; (3) The advance cost of insurance for each year is the natural premium required for the full amount named in the contract to be paid in the event of death within the year; (4) The present value of the future yearly normal costs of insurance is the single premium for the sum insured in the event of death occurring within the unexpired term named in the contract.

Table showing the reserves on a Pure Endowment, Term, and Endowment Insurance Policy, issued at age 40 for $1,000, for the term of 10 years. Actuaries' Table, Four per Cent.

	Endowment.	Term.	Endowment Insurance.
Beginning 1st year.....	74.169	11.590	85.759
End 1st year..... ...	77.948	1.709	79.657
End 2d year.....	159.903	3.253	163.156
End 3d year.....	246.120	4.592	250.712
End 4th year.....	336.895	5.642	342.537
End 5th year.....	432.573	6.297	438.870
End 6th year.....	533.531	6.469	540.000
End 7th year.....	640.223	6.019	646.242
End 8th year....	753.152	4.863	758.015
End 9th year.....	872.866	2.892	875.758
End 10th year.....	1,000.00	0	1,000.00

The first column shows the net premiums and reserves on a pure endowment contract, and it is evident to every actuary that the entire premiums received must be accumulated and retained by the company until the end of the period, to enable it to meet its endowment obligations to the surviving policy-holders.

The second column shows the net premium and reserves on a term policy. The premium here shown is intended to meet, and does meet, every requirement on a normal basis, for the insurance of $1,000 in the event of death within the term of ten years.

If we unite the two forms of contract we do not impair the distinctive characteristic of either. Each performs its function in combination just as effectively and in precisely the same manner as when standing alone. In support of this statement I beg to quote from a paper written by Walter C. Wright, and published in the *Spectator* under date of September 17th, 1896. This article treats of 20-year term policies and 20-year endowment insurance policies, and Mr. Wright says: "Since each term premium is admitted to be enough to carry all the insurance or meet the death-claim of $1,000 in any event and pay expenses, to say nothing of yielding some surplus, the differences may be taken as the payments specifically required to meet the endowment claim."

The representatives of a person insured under an endowment insurance contract, and dying before the expiration of the term, are entitled to a settlement of the claim on the basis of the term part of the contract, and they are not entitled to the whole or any part of the reserve on the endowment. The term premium amply provides for the contingency of death, and should be allowed to perform its mission.

In support of this proposition I beg to quote from an address made by Augustus F. Harvey, at a recent Convention of Mutual Life Underwriters, at Kansas City, Missouri, and which appeared in the *Weekly Underwriter* of December 12th, 1896. In that address Mr. Harvey said:

"The distinction between pure insurance and pure endowment is not always sufficiently comprehended when the attempt is made to define the 'legal' reserve, or to show that such reserve is or is not paid out under certain conditions. The distinction can be best illustrated by an example: Suppose that John Doe takes a policy of term or pure insurance of $1,000, to expire at the end of five years, and at the same time makes a contract for a pure endowment of the same amount to mature at the end of five years, and pays for each policy a single premium. The essential provision

in the first is that if he dies within the five years from issue his heirs shall receive $1,000; of the second, that if he lives to the end of five years he shall receive $1,000; in neither case to take anything unless the event provided for happens. The premiums are based upon these essential and precisely opposite conditions. He cannot die and live also; he cannot live and be dead also; but at the end of five years he must be in one or the other status. If he is dead, his assigns will have received the $1,000, and neither he nor they have any possible interest in the other contract. . . ."

In further support of this proposition I include quotations from a paper prepared by Rufus W. Weeks, in reply to an interrogatory of the Honorable Minister of Finance of Russia. On page 5 appears the following:

"The foregoing table shows that in the event of the deaths of the four insured men at any time within the twenty years, the first of the above policies will prove to have been much more advantageous than any of the others, and each of the others less advantageous, in their order, to a very marked degree. And yet, in spite of this inequality, there is no inequity, for there is another contingency, not taken into account in the above table, the contingency that the insured may survive the twenty years. If that event happens to the four men, they will stand as follows:

"The first, who took the 20-year term policy, will receive nothing whatever, and the protection to his family will cease.

"The second, who took the ordinary life policy, will find himself in possession of the valuable right of continuing the protection of 10,000 roubles to his family, by continuing to pay premiums at the low original rate fixed at his age of twenty years previous.

"The third, who took the 20-payment life policy, will find himself in possession of the still more valuable right of retaining the 10,000 roubles protection to his family, without any further payment of premium.

"The fourth, who took the 20-year endowment insurance, will receive 10,000 roubles in cash.

"These advantages are, as will be seen, in inverse order to those shown in the table, and the superiority of one form of policy over another under this last contingency is the mathematical equivalent of its inferiority under the contingencies shown in the table. These various combinations of the two elements of insurance are therefore all equitable and right, and the same is true of all the possible combinations of these two elements."

And on page 7 appears the following:

"It has been said that the accumulation system, by omitting in the distribution of savings those policies which have ceased by death or lapse during the accumulation period, robs the families of the unfortunate to the extent of the dividends they would have received under an annual dividend system. The principles above

established show that this is an entire misunderstanding of the case. It would be equally proper, or even more proper, to say that a company in issuing, for example, a policy on the 20-year endowment plan, robs the family of the insured, if he dies, of the additional amount of insurance which the premium he paid would have bought if applied on the ordinary life table. For example, at age 40, a 20-year endowment insurance of 10,000 roubles requires a premium of 530 roubles per annum, but the same premium would have paid for a 16,460 rouble ordinary life policy. Now, if an applicant, who has chosen to take a 20-year endowment insurance policy of 10,000 roubles, should be so unfortunate as to die during the twenty years, has the company robbed his family of 6,460 roubles? No; because the applicant, in taking a policy, had the right to combine the two kinds of provision, that for his family and that for himself, in such proportion as he thought best, and the company had the right to give him the opportunity to do so. *The application of the same principle* (though in a much less degree) shows it to be right for the company to give the applicant the opportunity to choose between an annual dividend policy and one on the accumulation plan, and equally right for the applicant to make such choice according to his own judgment."

It will be observed that the application of the same principle is made on the accumulation plan of dividends, as inherently attaches to the endowment feature in a contract where insurance, in the event of death, is combined with an endowment. What does this principle mean? It is sharply defined in the accumulation plan of dividends, and there is absolutely no question in any mind but that in its application thereto it means that the surplus arising in any class shall be retained for a certain number of years, and paid only to those who survive the stipulated period. Those who drop out for any reason, whether it be by lapse, by surrender, or by death, have no share whatever in the surplus. We may narrow this down somewhat so as to present a more analogous case, and say simply that those who die during the accumulation period have no share in the accumulated surplus. If " . . . the application of the same principle" means anything, it means that *the reserve fund in the hands of the company, pertaining to the endowment part of any contract, cannot be used for the payment of death losses*, but must be retained for the benefit of surviving members in precisely the same way that dividends are on the accumulation plan.

Suppose instead of being a 10-year endowment insurance contract there were two contracts—one a pure endowment and the other a corresponding term policy—then there would be no ques-

tion about the term contract standing on its own merits as to cost, and the negative cost on the pure endowment would not be considered as an offset to modify or balance it.

It is contended, however, that for the purpose of determining the cost of insurance, two policies as above described on the same life and in the same company are not the equivalent of one policy combining the two contracts. I have always admired the beautiful harmony in results secured by different methods of computation and combination in the mathematics of life insurance, and if it be true that a 10-year term policy and a 10-year pure endowment taken by the same life in the same company are not the equivalent of a 10-year endowment insurance policy, then to my mind there is a discord which mars the beauty and distorts the symmetry of the whole structure.

It may be held that death-claims are paid out of the general funds, and that it is a mere fiction or abstraction to undertake to make any such fine separation of the funds.

As a practical proposition this is not true in this country, for extensive tables have been prepared and used, showing the cost of insurance on the basis of the "net amount at risk"; laws have been passed requiring companies to be governed on that basis, and recently we have found the same principle entered in some of the blanks on which annual reports are required.

It is held by many that, because the reserve at the beginning of the last year on an endowment insurance policy is equal to the discounted value of a payment certain in one year corresponding with the amount insured, it is simply *that* and nothing more, and that, therefore, there is no contingency or risk, and hence no cost of insurance. The formula for this would be: $S.\frac{1}{1+i}$. Now, if this is so, the above expression does not *per se* come within the mathematics of life insurance, for all such computations are based on the contingency of human life. The expression $\frac{M_x+n-1-M_x+n}{D_x+n-1}+\frac{D_x+n}{D_x+n-1}$ represents the reserve at the beginning of the last year on an endowment insurance policy for one dollar in the ordinary nomenclature of life insurance, and it also represents contingencies that exist and on which it is based. It may be equal to a quantity not involving contingencies, and yet in itself it does involve them. $\frac{M_x+n-1-M_x+n}{D_x+n-1}$ represents

the cost of insuring one dollar for one year at age $x+n-1$. It constitutes part of the combined reserve for the specific purpose of insuring one dollar in the event of death during the year, and its function is not neutralized by an equal negative cost in the expression $\frac{D_{x+n}}{D_{x+n-1}}$; for the amount is payable if death occur, and no death-claim can properly be paid out of $\frac{D_{x+n}}{D_{x+n-1}}$.

It is my belief that there is a cost for insurance in the last year of an endowment insurance policy, and that it is on the full amount named in the contract, and that there is a sufficient sum in the hands of the company to pay the amount as a death-claim, if it become such, without encroaching on the endowment reserve.

As a general proposition it may be stated that there is as much difference between the payment of a matured endowment and a death-claim as there is between a living man and a dead one.

In the *Spectator* of December 31st, 1896, appears another article by Walter C. Wright, on "The Life Insurance Premium." After showing that each annual premium on a 10-year pure endowment is the equivalent of a single premium of a certain sum, he goes on to say,

". . . When pure endowment is coupled with temporary insurance, as under an ordinary endowment policy, no real change takes place in the status of the reserve accumulating to meet the endowment claim, but the priority and excess of the amount of the contingent insurance claim over the endowment reserve which makes it perfectly safe to assume that the policy-holder will not seek to surrender it in clearly impaired health ; also makes it safe and equitable to use the reserve in part payment of the death or insurance claim, should it occur, or to repay it in case of an offer to surrender the policy for cash, together with any like reserve arising from the level premium of the temporary insurance."

If it be true, as stated in his September article, that the "term premium is admitted to be enough to carry all the insurance or meet the death-claim of $1,000 in any event," then it is not proper, when a term policy is coupled with a pure endowment, to appropriate the reserve on the pure endowment portion of the contract in part payment of the death or insurance claim, as stated in the second article.

Let us look for a moment at the term part of the contract.

Table showing the progress of a fund formed by the contributions of 78,653 members, each insured for $1,000, at age 40, for 10 years only, at an annual premium of $11.589565. Comb. Exp. Int. Four per Cent.

	Col. 1.	Col. 2.	Col. 3.	Col. 4.	Col. 5.	Col. 6.	Col. 7.	Col. 8.	Col. 9.
Age.	Living.	Fund at Commencement of the Year.	Premiums Paid at Commencement of the Year.	Sum of Columns 2 and 3.	Interest Earned in the Year.	Sum of Columns 4 and 5.	Amount of Claim Paid at End of Year.	Fund After Paying the Claims End of the Year.	Amount of Fund for each Survivor at end of the Year.
40	78653	000000.00	911554.05	911554.05	36462.16	948016.21	815.000	133016.21	1.70888
41	77838	133016.21	902108.56	1035124.77	41404.99	1076529.76	826.000	250529.76	3.25313
42	77012	250529.76	892535.57	1143065.33	45722.62	1188787.95	839.000	349787.95	4.59199
43	76173	349787.95	882811.93	1232599.88	49304.00	1281903.88	857.000	424903.88	5.64162
44	75316	424903.88	872879.67	1297783.55	51911.34	1349694.89	881.000	468694.89	6.29670
45	74435	468694.89	862669.27	1331364.16	53254.57	1384618.73	909.000	475618.73	6.46871
46	73526	475618.73	852134.35	1327753.08	53110.13	1380863.21	944.000	436863.21	6.01889
47	72582	436863.21	841193.80	1278057.01	51122.28	1328179.29	981.000	348179.29	4.86277
48	71601	348179.29	829824.44	1178003.73	47120.15	1225123.88	1021.000	204123.88	2.89209
49	70580	204123.88	817991.50	1022115.38	40884.62	1063000.00	1063.000	000000.00	0.00000
50	69517								

It is to be remarked, first, that the average reserve per policy at the end of the first year is found by dividing the total reserve of $133,016.21 by 77,838, the number who survive the year, and therefore the 815 dead policies have no share whatever in that reserve, and hence it is wrong to assume that the risk of the first year is modified in any way by the terminal reserve.

Second, That the reserve at the end of any year is for the living and not the dead policies, and therefore it is an error to count the reserve at the end of the current year in arriving at the amount at risk on those policies that have ceased by death during the year.

Third, That it is wrong in principle and in fact to assume that the equity of each living policy-holder is measured by the reserve.

A simple illustration will suffice :

The average reserve at the end of the first year is $1.71. The premium paid the second year is $11.59. With a year's interest added these sums amount to $13.83.

In the second year, 826 policies, each with an average credit of $13.83, drop out by death, and the payment on each is $1,000.

It is evident that the individual equity of those 826 policies at the time of valuation was not measured by the reserve of $1.71.

We cannot go further in this matter than to say that an aggregate reserve of $133,016.21 will average $1.71 in precisely the same manner that we say the expectation of life at age 40 will average 27.28 years, and it would be just as absurd to say that all men, age 40, will live the average expectation as to say indiscriminately that each person insured has an equity equal to the average reserve.

The reserve is a community, rather than an individual, interest.

We have seen that those who die in the first year have no share in the reserve at the end of the year; similarly those who enter the second year and die before its close have no share in the reserve at the end of the second year, and it may be stated generally that those who die in any year on any form of policy have no share in the reserve at the end of that year. Moreover, those who insure in any year can have no claim on the reserve at any subsequent period, as for instance at the end of ten years unless they survive that period.

This leads us to the conclusion that the reserve at the end of any year is a pure endowment. This is practically illustrated in the following manner: If any policy be issued involving a reserve, and the reserve is guaranteed at the end of one, five, ten or any number of years, it is payable only in the event of the life surviv-

ing the term, and therefore is a pure endowment. The fact that the reserve is guaranteed does not in any manner affect the principle underlying its creation, and the obligation of the company would be precisely the same to the mass of its members, on the same standard of valuation, whether the reserve were guaranteed or not.

This can be demonstrated in another way. The initial reserve in any year provides for two things: (1) For the payment of the amount insured if death occur within the year; and (2) For a pure endowment equal to the reserve at the end of the year, and hence the reserve on policies which become death-claims must be retained by the company in order to meet its obligations to the survivors.

The reserve on any form of policy at the end of any period is equal to such a sum as a pure endowment, as the excess of premiums paid to provide the actual insurance carried, will purchase.

As an illustration:

The reserve at the end of twenty years on a life policy issued at age 30 for $1,000 by ten annual premiums is $481.91.

Annual premium paid is $37.658.

Annual premium by ten payments for a twenty-year term policy for $1,000 is $15.865.

Annual premium by ten payments to secure a pure endowment at the end of twenty years for $481.91 is $21.793, which represents the difference between the premium actually paid and that required for the 20-year term policy.

If the principle here stated be correct, then the reserve on any policy involving insurance cannot be considered as a portion of the amount paid on a death-claim.

In comparing an annual premium for life at age 32 with the natural premium on page 21 of Wright's "Savings Bank Life Insurance Tables," appears the following: "Let us suppose the company to consist of 84,831 members. It is plain that if each paid $18.04 instead of $8.41, the 742 who die in the first year would pay in advance toward their own claims 742 times $9.63, or $7,145.46 more than on the other plan.

"This would be so much saved to the other 84,089 members and would be about 8½c. each, so that their insurance would cost them only about $8.32½ instead of $8.41. Consequently, the company would have on hand from each member $18.04 minus $8.32½, equal to $9.71½, as reserve, which at the end of the year at four per cent. would amount to $10.10."

The germ of the whole subject lies right here, and there are one or two thoughts in connection with this statement deserving attention :

(1) That the idea of the excess of premiums paid over the natural premium by those who die is so much saved to the surviving members would seem to agree with the thought already advanced, that policies terminated by death have no share whatever in the reserve.

(2) If the excess of premiums paid over the natural premiums by the 742 who die belongs to those who survive the year, it must belong to them simply and only *because* they survive, and therefore represents the benefit of survivorship over and above what the survivors paid for a *similar* benefit. In other words, every premium paid represents $8.41 for insurance and $9.63 for the benefit of survivorship, or a pure endowment of $10.10.

(3) If the excess of premiums paid over the natural premiums belongs to those who survive the first year, simply because they survive, then for the same reason the excess of premiums paid in two years belongs to those who survive two years, and as the natural premium at age 32 would be the proper advance cost of insurance for the first year, so would the natural premium for age 33 be the proper advance cost for the second year, and generally the excess of premiums paid over the natural premiums improved at interest would belong to the survivors only, and the proper advance cost in each year would be the natural premium at the attained age.

It therefore follows that no part of such excess could be used in payment of death-claims until the actual premium paid was less than the natural premium required, and then the amount which was husbanded as a reserve performs its function by making up the deficit each year equal to the difference between the natural premium required and the premium actually paid up to the limit of the mortality table; thus harmonizing with the theory that on whole-life policies the level annual premiums perform the same office as the natural premiums, and that over the whole of life the one is the exact equivalent of the other, as per the following table, which is practically the same as that found on pages 15 and 16 of the Massachusetts Insurance Report for 1859, "Illustrative of the Necessity of Accumulation in Life Insurance."

COMBINED EXPERIENCE 4 PER CENT. WHOLE-LIFE POLICIES FOR $1,000 EACH. LEVEL ANNUAL PREMIUM, $16.972024.

Age.	No. living at beginning of year l_x.	No. dying during year d_x.	Premium Receipts.	Interest.	Fund.	Claims.	Reserve at end of year.
30	86,292	727	$1,464,550	$58,582	$1,523,132	$727,000	$796,132
31	85,565	734	1,452,211	89,934	2,338,277	734,000	1,604,277
32	84,831	742	1,439,754	121,761	3,165,792	742,000	2,423,792
33	84,089	750	1,427,161	154,038	4,004,990	750,000	3,254,990
34	83,339	758	1,414,432	186,777	4,856,199	758,000	4,098,199
35	82,581	767	1,401,567	219,991	5,719,756	767,000	4,952,756
36	81,814	776	1,388,549	253,652	6,594,958	776,000	5,818,958
37	81,038	785	1,375,379	287,773	7,482,110	785,000	6,697,110
38	80,253	795	1,362,056	322,367	8,381,532	795,000	7,586,532
39	79,458	805	1,348,563	357,404	9,292,499	805,000	8,487,499
40	78,653	815	1,334,901	392,896	10,215,296	815,000	9,400,296
41	77,838	826	1,321,068	428,855	11,150,219	826,000	10,324,219
42	77,012	839	1,307,050	465,251	12,096,519	839,000	11,257,519
43	76,173	857	1,292,810	502,013	13,052,342	857,000	12,195,342
44	75,316	881	1,278,265	538,944	14,012,552	881,000	13,131,552
45	74,435	909	1,263,313	575,795	14,970,659	909,000	14,061,659
46	73,526	944	1,247,885	612,382	15,921,925	944,000	14,977,925
47	72,582	981	1,231,863	648,392	16,858,180	981,000	15,877,180
48	71,601	1,021	1,215,214	683,696	17,776,090	1,021,000	16,755,090
49	70,580	1,063	1,197,885	718,119	18,671,095	1,063,000	17,608,095
50	69,517	1,108	1,179,844	751,518	19,539,456	1,108,000	18,431,456
51	68,409	1,156	1,161,039	783,700	20,376,195	1,156,000	19,220,195
52	67,253	1,207	1,141,420	814,465	21,176,080	1,207,000	19,969,080
53	66,046	1,261	1,120,934	843,601	21,933,614	1,261,000	20,672,614
54	64,785	1,316	1,099,533	870,886	22,643,033	1,316,000	21,327,033
55	63,469	1,375	1,077,197	896,169	23,300,399	1,375,000	21,925,399
56	62,094	1,436	1,053,861	919,170	23,898,431	1,436,000	22,462,431
57	60,658	1,497	1,029,489	939,677	24,431,597	1,497,000	22,934,597
58	59,161	1,561	1,004,082	957,547	24,896,226	1,561,000	23,335,226
59	57,600	1,627	977,589	972,513	25,285,327	1,627,000	23,658,327
60	55,973	1,698	949,975	984,332	25,592,634	1,698,000	23,894,634
61	54,275	1,770	921,157	992,632	25,808,422	1,770,000	24,038,422
62	52,505	1,844	891,116	997,181	25,926,720	1,844,000	24,082,720
63	50,661	1,917	859,820	997,702	25,940,241	1,917,000	24,023,241
64	48,744	1,990	827,284	994,021	25,844,546	1,990,000	23,854,546
65	46,754	2,061	793,510	985,922	25,633,979	2,061,000	23,572,979
66	44,693	2,128	758,531	973,260	25,304,770	2,128,000	23,176,770
67	42,565	2,191	722,414	955,967	24,855,151	2,191,000	22,664,151
68	40,374	2,246	685,229	933,975	24,283,355	2,246,000	22,037,355
69	38,128	2,291	647,109	907,379	23,591,843	2,291,000	21,300,843
70	35,837	2,327	608,226	876,363	22,785,432	2,327,000	20,458,432
71	33,510	2,351	568,733	841,087	21,868,251	2,351,000	19,517,251

Age.	No. living at beginning of year l_x.	No. dying during year d_x.	Premium Receipts.	Interest.	Fund.	Claims.	Reserve at end of year.
72	31,159	2,362	$528.831	$801,843	$20,847,926	$2,362 000	$18,485,926
73	28,797	2,358	488,743	758,987	19.733,656	2,358,000	17,375,656
74	26.439	2,339	448,723	712,975	18.537.354	2,339,000	16,198,354
75	24,100	2,303	409,026	664,295	17,271,675	2,303,000	14,968,675
76	21,797	2,249	369,939	613.545	15,952,159	2,249,000	13,703,159
77	19,548	2,179	331,769	561,397	14,596,325	2,179,000	12,417,325
78	17,369	2.092	294.787	508,484	13,220,597	2.092,000	11,128,597
79	15,277	1.987	259,282	455.515	11,843,394	1.987.000	9,856,394
80	13,290	1,866	225,558	403,278	10,485,230	1,866,000	8,619,230
81	11.424	1,730	193,888	352,525	9,165,643	1,730,000	7,435,643
82	9,694	1,582	164,527	304,007	7,904 177	1,582,000	6,322,177
83	8,112	1,427	137,677	258,394	6,718,248	1.427,000	5,291,248
84	6,685	1,268	113.458	216,188	5,620,894	1,268,000	4,352,894
85	5.417	1,111	91,937	177,793	4,622,625	1,111,000	3,511,625
86	4,306	958	73,082	143,388	3,728,095	958,000	2,770,095
87	3,348	811	56,822	113,077	2,939,994	811,000	2,128,994
88	2,537	673	43,058	86,882	2,258,934	673,000	1,585,934
89	1,864	545	31,636	64,703	1,682,273	545 000	1,137,273
90	1,319	427	22,386	46,386	1,206,045	427,000	779,045
91	892	322	15,139	31,767	825.952	322 000	503,952
92	570	231	9,674	20,545	534,171	231,000	303,171
93	339	155	5.754	12,357	321,282	155,000	166,282
94	184	95	3,123	6,776	176,182	95.000	81,182
95	89	52	1,511	3,308	85,999	52,000	33,999
96	37	24	628	1,385	36,012	24.000	12,012
97	13	9	221	489	12,722	9,000	3,722
98	4	3	68	152	3.942	3.000	942
99	1	1	17	38	1,000	1.000	0
	3,014.598	86.292	$51,163,832	$35,128,168		$86,292,000	

I have inserted this table for the purpose of saying that, in my judgment, the fund as a whole represents the entire cost of insurance and that the yearly distribution of that cost is expressed in the corresponding amount of death-claims paid.

Take the beginning of the last year in this table, if you please, when the premium paid is only $16.97, and it is certain the claim will fall due at the end of the year. We call upon the fund to contribute towards the cost of the claim in the same manner and for precisely the same reason that makes it necessary to do so in the tenth year of a 10-year term policy.

The premium paid on a 10-year term policy, at any adult age, is not sufficient to meet the cost in the last year, without the accu-

mulated reserve, and yet the advance "cost of insurance," according to the formula $q\ (S-V)$ is the natural premium at the advanced age.

It will be observed that the terminal reserve of the last year in this table is zero. For the purpose of this discussion there is no known reason why it should not be zero. The mortality table indicates that the only surviving person who reaches age 99 dies before another year is passed, and as the terminal reserve is universally computed after the death-claims ensuing in any year are deducted from the fund, and as this particular claim exhausts the fund, the terminal reserve is necessarily zero.

The mere statement of the fact that the initial reserve is equal to the present value of $1,000 at the end of the year, whether the person be dead or alive, is no sufficient reason why the universal rule of computing terminal reserves on whole-life policies should be changed at this particular point, and be computed before the death-claim is paid. Nor is it a sufficient answer to say, as Mr. Wright does in his *Savings Bank Life Insurance*, on page 29, that this "is called the 'ordinary whole-life policy,' but which is really a policy for $1,000 payable at death or 100." The policy can be paid only as an endowment if the insured survive age 100, and the table of mortality says he will not survive. This may be deemed a trivial point, but I shall endeavor to demonstrate that it is really of very great importance. We have seen in the tenth year, on a 10-year term policy for $1,000, taken out at age 40, that according to the formula for determining the so-called "cost of insurance," the result produces the equivalent advance premium required to insure $1,000 for one year at age 49. As the annual premium on the policy is $11.59, and the premium required for one year's insurance at age 49 is $14.48, it is necessary to use the terminal reserve at the end of the ninth year, amounting to $2.89, to make up the deficit. The principle is precisely the same, whether the computation be made in the tenth year on a 10-year term policy issued at age 40, or in the 70th year on a 70-year term policy issued at age 30, the only difference being that in the former case we require only $2.89 to make up the deficit, and in the latter case we require $942.00.

While it may be acknowledged that this line of reasoning is theoretically correct, yet the thought may still be preserved that, because at age 99 after the last premium has been paid, the reserve is equal to the present value of the face of the policy due in one year, it must in some way affect the "cost of insurance."

Table showing the progress of a fund formed by the contributions of 1,864 members, each insured for $1,000, at age 89, for 10 years only, at an annual premium of $333.05323. Comb. Exp. Four per Cent.

	1	2	3	4	5	6	7	8	9
Age.	Living.	Fund at Commencement of the Year.	Premiums Paid at Commencement of the Year.	Sum of Columns 2 and 3.	Interest Earned in the Year.	Sum of Columns 4 and 5.	Amount of Claim Paid at End of Year.	Fund After Paying Claims End of the Year.	Amount of Fund for each Survivor at end of Year.
89	1,864	0000.00	620811.22	620811.22	24832.45	645643.67	545.000	100643.67	76.303
90	1,319	100643.67	439297.21	539940.88	21597.64	561538.52	427.000	134538.52	150.828
91	892	134538.52	297083.48	431622.00	17264.88	448886.88	322.000	126886.88	222.609
92	570	126886.88	189840.34	316727.22	12669.09	329396.31	231.000	98396.31	290.255
93	339	98396.31	112905.04	211301.35	8452.05	219753.41	155.000	64753.41	351.921
94	184	64753.41	61281.79	126035.20	5041.41	131076.61	95.000	36076.61	405.356
95	89	36076.61	29641.74	65718.35	2628.73	68347.08	52.000	16347.08	441.813
96	37	16347.08	12322.97	28670.05	1146.80	29816.85	24.000	5816.85	447.450
97	13	5816.85	4329.69	10146.54	405.87	10552.41	9.000	1552.41	388.102
98	4	1552.41	1332.21	2884.62	115.38	3000.00	3.000	000.00	00.00
99	1								

For the purpose of bringing out the truth in a more forcible manner, as it appears to my mind, and to show the utter fallacy of Wright's Insurance Values, I have inserted on the previous page a table of 10-year term policies issued at age 89.

I have selected this age because at the end of ten years the fund is entirely exhausted, and there is no possible loophole by which a matured endowment can be substituted for a death-claim.

The application of the formula $q\ (S-V)$ produces $750 as the "cost of insurance" on $1,000 in the last year, and $750 is the result secured by improving $721.15 at four per cent. interest; and $721.15 is the premium required at age 98 to insure $1,000 for one year. As the premim paid by the insured is only $333.05, it is necessary to use the ninth year's terminal reserve of $388.10 to make up the difference in the "cost of insurance."

On Wright's theory of insurance values we then have this strange anomaly—that in the last year of a 10-year term policy of $1,000, issued at age 89, the "cost of insurance" is $750, and in the last year of a policy in all respects similar, except that it is issued one year later, namely, at age 90, the "cost of insurance" in the last year is nil.

It seems hardly possible to present the fallacy in a stronger light than this, but the importance of the subject suggests the statement that if we had a 10-year term policy issued at every adult age, the advance "cost of insurance" in the last year on every policy would be the premium required for the sum insured in the tenth year, *with the single exception of that issued at age* 90; and the anomalous result produced at that age leads inevitably to the conclusion that it is a fundamental error to ignore the fact that there is no survivor at age 100.

Table showing the advance cost of $1,000 in the tenth year of 10-year term policies on Elizur Wright's theory:

Age at Issue.	Advance Cost.	Ninth Year's Terminal Reserve required to make up deficiency.	Age at Issue.	Advance Cost.	Ninth Year's Terminal Reserve required to make up deficiency.
60	$57.78	$17.97	76	$197.21	$69.25
61	62.44	19.57	77	213.92	76.70
62	67.46	21.28	78	232.92	85.79
63	72.89	23.15	79	255.07	97.33
64	78.73	25.14	80	281.14	112.00
65	85.06	27.33	81	311.28	129.91
66	91.89	29.71	82	347.10	152.44
67	99.21	32.26	83	389.68	180.65
68	107.18	35.12	84	439.64	214.90
69	115.81	38.27	85	496.47	254.48
70	125.06	41.65	86	561.80	300.75
71	135 01	45.31	87	623.70	341.48
72	145.61	49.22	88	665.68	359.65
73	156.72	53.16	89	721.15	388.09
74	169.15	56.02	90	000.	597.64 ?
75	182.38	65.03			

These figures are a further confirmation of the statement already made, that ". . . the initial reserve in any year provides for two things: (1) For the payment of the amount insured if death occur within the year; and (2) For a pure endowment equal to the reserve at the end of one year." They also demonstrate that it is the function of the reserve fund to supply the deficiency in the cost of insurance, and not to modify that cost.

Attention is invited to the point that, in the last year of *any* adult term policy, where the largest drain is made on the reserve, the advance cost of insurance is always the natural premium for the face value of the policy.

Happily, we have now reached a point in the discussion where a stronger light can be focused on the last year of a 10-year endowment policy. If we assume three policies to be issued at age 90, the first being a 10-year term policy, the second a whole-life policy, and the third a 10-year endowment insurance policy, it is

evident that, although they are called by different names, there really is no difference between them, for

$$\frac{M_{90}-M_{100}}{N_{90}-N_{100}}=\frac{M_{90}}{N_{90}}=\frac{M_{90}-M_{100}}{N_{90}-N_{100}}+\frac{D_{100}}{N_{90}-N_{100}};$$

and therefore the results from every possible point of view must be the same for each of the three policies. It has already been shown that as a 10-year term policy, the advance cost in the last year is the natural premium, and hence it follows that, treated either as a life policy or a 10-year endowment insurance policy, the advance cost in the last year must also be the natural premium.

It is just as true of a 10-year endowment insurance policy issued at age 90, that the initial reserve in the 10th year is equal to the present value of a payment certain at the end of the year, as it is of a similar policy issued at any other age, and as this does not constitute a good and sufficient reason for saying that there is no risk, and consequently no cost, in the last year of a policy issued at age 90, the argument ceases to have force for a similar policy issued at any other age.

On page 399 of "Papers and Transactions," Vol. IV., Mr. Homans says: "It will be noted that Professor Wright makes the insurance value on a term insurance one year before its expiration, col. 1, the same as the net term single premium for that age, col. 6. For instance, in the last example, that of a 35-year term policy for $1,000, the insurance value at beginning of the last year is $85.07. This is the normal cost to insure $1,000 for one year at age 74, but it includes the net term reserve, $64.54, which is in hand, a partial payment in advance on account of the normal cost of insurance during that year, but it is not the premium 'which the policy is exposed to pay.' Deducting this net reserve from Wright's insurance value, we have $20.53, which is precisely the net term premium, the only amount that 'the policy is exposed to pay,' and which consequently is the only correct insurance value as prescribed by a strict interpretation of the Massachusetts statute."

I beg to disagree with Mr. Homans in this statement. The law reads: "Said surrender charge shall be eight per cent. of the insurance value of the policy at the date of default, which insurance value is the present value of all normal yearly costs of insurance which, by its terms, said policy is exposed to pay in case of its continuance."

There is nothing here about the "premium," but simply the "insurance value" which this particular policy is exposed to pay in

the last year. Now, as the reserve at the end of 34 years on a 35-year term policy is "exposed to pay" the insurance in the 35th year, it is quite proper that it should be added to the 35th premium in determining the insurance value for the last year.

On page 393 of the same volume Mr. Homans says: "At date of issue the insurance value is always the net single term insurance premium. Subsequently, under a correct interpretation of the Massachusetts statute, at least if average or level premiums be paid, it must always be the net single term insurance premium, less the net insurance reserve for the unexpired term. This reserve is already in hand, a partial payment in advance on account of future yearly normal costs of insurance, and out of it the company can take pay as these normal costs are incurred. In single premium and limited premium contracts the current normal yearly costs of insurance are paid out of the paid-up term insurance reserve."

As it has been shown that the true function of the reserve is to supply the deficiency in the cost of insurance, and not to modify it in any way, it naturally follows that exception must be taken to the position here assumed by Mr. Homans, except so much as refers to the date of issue.

The conclusion of the whole matter, as it appears to me, is that the "insurance value" or "cost of insurance" computed at the beginning of each year is the natural premium required for the full amount named in the contract to be paid in the event of death occurring within the year, and that the present value of the future yearly normal costs of insurance, which a policy by its terms is exposed to pay, is the single premium for the sum insured in the event of death occurring within the unexpired term named in the contract.

Level Premium Life Insurance—Historical Note.

JOSEPH A. DE BOER.

EIGHT tables, compiled from the last twenty-five reports issued by the Life Insurance Department of the State of New York, are submitted for insertion in the Proceedings of the Society. It may be claimed for this data that it substantially represents by far the greater part of level premium life insurance transactions during the second half of the first half century of the business in the United States. It therefore affords a basis on which to found some idea of the influence exerted by that business in the economy of the people and of a fairly accurate conception of the laws of exchange, by which it has been governed as a whole. The following objections may be made to this material, that it does not represent throughout the history of the same companies and that, for a part of the period only, it includes the history of some companies now in action, and of others now retired. On the contrary, it is true that the companies contributing their data to these tables did business always on substantially like plans and upon the same system, while their yearly statistical returns, made under oath, conformed to like methods of reporting and, virtually, like methods of accounting. The data, therefore, possesses the authority of a most careful census and, as nearly as seems possible to me, supplies a proper basis for some study of life insurance economics, as practiced by the companies of the United States. It also represents the greater part of that practice, as all the important offices have always sought admission to this State on account of its preponderating wealth, population and commercial influence. In the case of companies doing both a domestic and foreign business, total transactions are, of course, employed.

Perhaps it would be best to submit these tables without further comment, merely inviting to their inspection the reminiscent, critical or deductive energies of the members. For there are those in the Society who have been so long identified with and are so great a part of this accumulated evidence, that some statement from them would bear much interest and instruction. What has been done? What does this matter teach and what does it predict?

Does it substitute any fact for an appearance, or any demonstration for an impression?

This data covers receipts amounting to $3,549,500,440, disbursements of $2,577,085,067, and income saved of $972,415,373, an astounding exhibit, even for this country of wealth and work, within a period of twenty-five years. At the close of 1896 there were thirty-six companies doing business in New York by the authority of that State. Their insurance holdings equaled 1,975,747 policies, insuring $4,967,576,418, excluding industrials. They reported gross assets of $1,228,324,324, of which sum $174,716,203 was surplus. Figures of this magnitude, carrying the authority of sworn reports, and certificated by the actuarial skill of this important department, warrant the belief that they may be relied upon for some examination of the economic laws involved. The commercial importance and, in some sense, the possibilities of life insurance stand proved. Prior to the period under examination the growth of life insurance was rapid and constant, excepting 1868 and 1869, when there were evidences of perturbation; but even in the latter year there were fourteen new companies admitted to New York. During the decade immediately following 1872, however, the business, regarded as a whole, suffered a decadence and the number of companies fell from fifty-nine (59) to twenty-nine (29). From the organization of the department in December of 1859, down to January 1st of 1897, sixty-four (64) companies have withdrawn from business in this State. Of these, thirty-five (35) were chartered by New York and twenty-nine (29) by foreign states or countries, and only four (4) of these ceased operations prior to 1870. The classified causes of failure include hard times, false methods, unfulfilled pledges, incompetent management, undue inflation and lack of public confidence. Contraction of the business developed forced withdrawals, voluntary retirement and amalgamation. Twenty-one (21) companies were reinsured, twenty-six (26) were placed in the hands of receivers, nine (9) withdrew and have not been traced, seven (7) had their grants of authority revoked, and one (1) practically did no business from the start. The impression left upon the supervising mind* of this period was, that, all things considered, reinsurance possessed grave objections, and that receiverships, because of variations in the practice of different officers, made a division of property a matter of much difficulty. In spite

* William Smyth.

of all unsatisfactory conditions, there was an evolution of the stronger and more firmly grounded companies which soon after vastly extended the market for insurance and held it. The retirement of so many companies during the early years of this period and the lapses induced by consequent lack of public confidence in others, directly and indirectly explain the contraction in total outstanding risks. During the same years many companies continued to grow in size and strength. The first four tables demonstrate how positive and steady was the revival of confidence and the expansion of the business, until, by the end of 1896, there were thirty-six companies admitted by the State.

Without emphasizing by repetition here the influence exerted by the business over commercial exchanges, without referring here to the educational work done for the people through inculcating lessons of prudence, prevision and thrift, I desire to pass directly to two propositions :

(1) These tabulations historically demonstrate the essential rightness of both the theory and practice of level premium life insurance.

(2) These tabulations present effective transactions and suggest potential powers so varied and of so much consequence to all the people as to invite some species of attention from the Federal Government itself.

From a glance at Table V. it will be readily concluded that the character of the business, as a whole, is mutual and that capital stock, so called, plays insignificant parts. The same experience indicates a connection between decreasing policy amounts, increasing claims resisted (moral hazard) and hard times. The surplus ratio tends to improve during the same period and has shown this tendency in the last twenty-five years, taking into account the change made in the standard of valuation by the law of 1884. Total summations for the entire period, 1872-1896, show that receipts were apportioned as follows : premiums, 77.88 per cent.; interest and rents, 21.32 per cent.; other sources, 0.80 per cent.; but during the last eight years premiums have provided on an average of over 80 per cent. of the total income on account of the rapid increase in new insurance and a concurrent falling off in relative interest receipts. The ratio of income saved, dependent on the conditions of confidence and the times, was for the entire period 27.4 per cent. It fell to 10.36 per cent. in 1878 and rose to 32.75 per cent. in 1891. Since the latter year there has been a

downward tendency in this ratio because of the widespread depression in all commercial and industrial interests.

An analysis of disbursements is more suggestive. That of income tells what the policy-holders are doing; that of outgo, what the business is doing for them and how it is done. Out of every $100 disbursed, $72.89 was paid to policy-holders for claims, lapse values and dividends (surplus is, perhaps, the more preferable term). As the institution, regarded as a whole, is virtually mutual, as all income arises from premiums paid or from the earnings of invested, unexpended premiums, it appears that it cost the insured $27.11 to redistribute $72.89 among themselves. In other words, the distribution of $100 in claims, lapse values and dividends has cost $37.19, including the costs of State supervision and taxation. Claims, as a per cent. of total outgo during the last eighteen years, exhibit a remarkable correspondence, ranging from 45 per cent. to 48 per cent. This fact of even experience is also true in lapse values and for the same times, although, as was natural, the ratios rapidly increased during the seven lean years of 1873-1879. The decline in returns to members lies in the dividend or surplus account. These ratios, the dividend or surplus ratios, may be examined with profit by the light of the expense ratios in Table VII., of the interest ratios in Table VIII., and of the premium ratios in Table VI. The expense account of the future calls for revision.

TABLE I.

SUMMATIONS, LEVEL PREMIUM LIFE INSURANCE COMPANIES, REPORTING TO THE NEW YORK STATE LIFE INSURANCE DEPARTMENT. Twenty-five Years, 1872–1896. (1)

Year ending Dec. 31.	No. of Comp'ies	Total Outstanding Insurance.	Total Gross Assets.	Total Gross Surplus.	Outstanding Policies.
1872	59	$2,114,742,591	$335,168,542	$46,841,436	804,444
1873	56	2,086,027,178	360,140,684	48,589,757	817,081
1874	50	1,997,236,230	387,281,896	58,889,345	799,534
1875	45	1,922,043,146	403,142,981	60,812,029	774,625
1876	38	1,735,995,190	407,406,332	61,126,552	706,179
1877	34	1,556,105,323	396,420,590	61,604,098	633,096
1878	34	1,480,921,223	404,079,144	64,493,518	612,843
1879	31	1,439,961,165	401,515,793	65,277,722	595,485
1880	30	1,475,995,172	417,951,009	71,561,669	608,681
1881	29	1,539,848,581	429,277,459	72,413,163	627,265
1882	29	1,637,648,872	449,602,347	76,751,391	661,458
1883	29	1,763,730,015	471,805,920	80,298,093	705,659
1884	29	1,870,728,059	491,487,719	81,811,191	750,567
1885	29	2,023,517,488	523,664,678	92,749,487	814,691
1886	29	2,222,414,050	560,125,359	101,262,427	848,481
1887	29	2,474,507,120	595,679,477	(2) 72,427,665	929,853
1888	29	2,761,577,128	641,747,870	79,357,028	1,021,631
1889	30	3,144,677,311	696,943,722	86,745,027	1,139,894
1890	30	3,542,955,751	753,228,759	88,739,361	1,272,895
1891	29	3,861,584,383	819,402,852	96,356,907	1,400,007
1892	31	4,199,444,397	(3) 903,734,537	(3) 114,060,520	1,532,812
1893	32	4,511,036,550	971,857,224	116,549,186	1,671,039
1894	33	4,657,583,046	1,056,331,683	139,740,545	1,780,307
1895	35	4,818,170,945	1,142,419,926	159,750,174	1,887,808
1896	36	4,967,576,418	1,228,324,342	174,716,203	1,975,747

NOTE 1.—This Table is compiled from the New York Insurance Report for 1897.
NOTE 2.—Change in standard of valuation from American Experience, 4½ per cent., to Combined Experience, 4 per cent., Laws of 1884, Chapter 341.
NOTE 3.—Beginning with 1892, the assets and surplus of companies transacting principally or solely industrial insurance are included.

TABLE II.

RECEIPTS OF LEVEL PREMIUM LIFE INSURANCE COMPANIES, REPORTING TO THE NEW YORK STATE LIFE INSURANCE DEPARTMENT. Twenty-five Years, 1872–1896. (1).

Year ending Dec. 31.	No. of Companies.	Premiums.	Interest and Rents.	Other Sources.	Total Income.	Amount Going to the Reserve (2).
1872	59	$96,602,683	$18,421,779	$2,281,567	$117,306,029	$39,098,772
1873	56	96,000,089	21,067,796	1,328,617	118,396,502	33,895,056
1874	50	89,434,996	22,956,449	3,341,269	115,732,714	34,500,383
1875	45	83,788,511	23,902,109	954,465	108,645,085	28,662,618
1876	38	72,056,698	23,971,999	329,886	96,358,583	19,740,400
1877	34	62,933,690	22,976,695	251,759	86,162,144	11,824,820
1878	34	57,236,335	22,921,443	305,221	80,462,999	8,334,929
1879	31	52,721,720	23,263,527	189,707	76,174,954	9,274,611
1880	30	52,914,843	22,475,494	540,762	75,931,099	11,109,681
1881	29	55,976,300	22,821,438	610,109	79,407,847	14,253,849
1882	29	60,504,274	23,049,576	1,516,284	85,070,134	18,827,789
1883	29	67,322,119	23,883,611	1,357,033	92,562,763	20,819,174
1884	29	72,016,264	24,722,825	235,288	96,974,377	20,342,280
1885	29	78,513,171	26,208,215	806,478	105,527,864	25,268,316
1886	29	88,726,915	27,263,510	970,890	116,961,315	34,642,220
1887	29	100,584,162	29,540,527	532,837	130,657,526	37,210,237
1888	29	114,359,530	31,692,973	971,928	147,024,431	43,655,285
1889	30	133,162,864	33,213,169	1,808,666	168,184,699	53,681,338
1890	30	149,553,949	35,929,711	1,941,299	187,424,959	60,771,430
1891	29	162,624,444	38,777,833	529,148	201,931,425	66,139,375
1892	31	180,608,156	41,346,178	1,070,664	223,024,998	70,134,665
1893	32	192,706,839	43,693,059	283,308	236,683,206	70,142,892
1894	33	205,132,044	48,047,599	3,444,835	256,624,478	78,761,145
1895	35	215,199,302	50,361,121	1,336,779	266,897,202	81,124,300
1896	36	223,714,321	54,094,853	1,563,933	279,373,107	80,199,808
1872–'96	..	$2,764,394,219	$756,603,489	$28,502,732	$3,549,500,440	$972,415,373

NOTE 1.—The receipts and disbursements include these items for companies transacting principally or solely industrial insurance.
NOTE 2.—The amount going to reserve, so called, is the difference between total income and total disbursements in Table III.

TABLE III.

PAYMENTS TO POLICY-HOLDERS BY LEVEL PREMIUM LIFE INSURANCE COMPANIES, REPORTING TO THE NEW YORK STATE LIFE INSURANCE DEPARTMENT. Twenty-five Years, 1872-1896.

Year ending, Dec. 31.	No of Companies.	Losses and Claims.	Lapse Values.	Dividends.	Total Payments to Policy-holders.	Total Disbursements for all causes.
1872	59	$25,672,379	$13,922,012	$20,077,997	$59,672,388	$78,207,257
1873	56	27,232,435	16,669,594	22,938,235	66,840,264	84,501,446
1874	50	25,797,860	22,453,955	16,617,018	64,868,833	81,232,331
1875	45	27,174,631	20,414,574	17,900,605	65,489,810	79,982,467
1876	38	25,567,850	21,354,376	16,187,129	63.109,355	76,618,183
1877	34	26,103,287	19,152,317	15.397.369	60,652,973	74,337.324
1878	34	29.153,226	17,095.994	14,637,449	60,886,669	72,128,070
1879	31	29,973,134	12,703,188	13,330,824	56,007,146	66,900,343
1880	30	29,454,058	9,572,350	13,081,541	52,107.949	64,821,418
1881	29	30,956,636	8,497.354	12,579,151	52,033,141	65,153,998
1882	29	29,826,874	9,255.077	13,555,105	52,637,056	66,242,345
1883	29	33,894.306	8,837,857	13,417,465	56,149,628	71,743.589
1884	29	35,602,543	9.503,530	13,043,498	58,149,571	76,632,097
1885	29	38,624,822	9,630,269	12,963.660	61,218,751	80,259,548
1886	29	38,276,390	9,433,378	13.218,286	60,928,054	82,319,095
1887	29	42,827,054	10,413,879	14,852,624	68,093,557	93,447,289
1888	29	48,569,965	11,234,569	14,324,827	74,129,361	103,369,146
1889	30	53.081,834	12,240,142	13,951,691	79.273,667	114,503,361
1890	30	58,608,615	13,827,225	14,271,501	86,707,341	126,653,529
1891	29	62,731,497	16,230,891	13,991,226	92 953,614	135,792,050
1892	31	72.576,866	15,658,759	14,386,195	102,621,820	152,890,333
1893	32	75.903.820	19,839,418	14,823,176	110,566,414	166,540,314
1894	33	78,313,162	23,164,108	14,577,455	116,054,725	177,863,333
1895	35	84,791,622	22,889.493	15.297,604	122,978,719	185,772,902
1896	36	90,768,307	26,368,039	17,083,169	134,219,515	199,173,299
1872'-96	..	$1,121,483,173	$380,362,348	$376,504,800	$1,878,350,321	$2,577,085,067

TABLE IV.

MANAGEMENT DISBURSEMENTS BY LEVEL PREMIUM LIFE INSURANCE COMPANIES, REPORTING TO THE NEW YORK STATE INSURANCE DEPARTMENT. Twenty-five Years, 1872–1896.

Year ending Dec. 31.	No. of Companies.	Dividends to Stockholders.	Commissions.	Salaries.	Miscellaneous.	Total Expenses.
1872	59	$528,008	$7,211,896	$4,510,875	$6,284,090	$18,534,869
1873	56	452,976	6,532,218	4,208,864	6,467,124	17,661,182
1874	50	376,619	5,939,751	4,070,884	5,976,244	16,363,498
1875	45	364,062	5,425,135	3,826,673	4,876,787	14,492,657
1876	38	334,410	4,830,314	3,260,108	5,083,996	13,508,828
1877	34	356,785	3,626,198	3,114,040	6,587,328	13,684,351
1878	34	249,350	3,068,377	2,952,344	4,971,330	11,241,401
1879	31	278,260	3,383,084	2,738,019	4,493,834	10,893,197
1880	30	322,826	3,831,751	3,083,094	5,475,798	12,713,469
1881	29	250,624	4,477,223	3,240,526	5,152,484	13,120,857
1882	29	266,501	5,102,336	3,439,899	4,796,553	13,605,289
1883	29	298,697	5,913,760	3,768,052	5,613,452	15,593,961
1884	29	329,091	6,757,617	4,080,832	7,314,986	18,482,526
1885	29	325,531	7,790,184	4,480,264	6,444,818	19,040,797
1886	29	324,501	9,529,559	4,858,976	6,678,005	21,391,041
1887	29	322,632	12,068,335	5,544,435	7,418,330	25,353,732
1888	29	333,907	14,521,214	6,072,519	8,312,145	29,239,785
1889	30	331,526	18,275,737	6,820,789	9,801,642	35,229,694
1890	30	329,407	20,807,587	7,503,899	11,305,295	39,946,188
1891	29	488,063	21,379,691	8,246,317	12,724,365	42,838,436
1892	31	602,783	24,451,161	10,140,167	15,074,402	50,268,513
1893	32	768,563	27,044,695	11,499,979	16,660,663	55,973,900
1894	33	735,063	29,854,751	13,672,918	17,545,876	61,808,608
1895	35	741,312	29,804,166	15,571,620	16,677,085	62,794,183
1896	36	793,052	29,552,339	16,031,189	18,577,204	64,953,784
1872–'96	..	$10,504,549	$311,179,079	$156,737,282	$220,313,836	$698,734,746

TABLE V.

CAPITAL INVESTED, ETC., LEVEL PREMIUM LIFE INSURANCE COMPANIES, REPORTING TO THE NEW YORK STATE LIFE INSURANCE DEPARTMENT. Twenty-five Years, 1872–1896.

Year ending Dec. 31.	No. of Companies.	Capital Invested.	Claims Resisted.	Average Amount per Policy.	Net Assets to Risks in Force per $100.	Gross Assets to Risks in Force per $100.	Gross Assets to Gross Liabilities per $100.	Claims Resisted to Total Claims % per $100.
					(1)	(2)	(3)	(4)
1872	59	$9,667,416	$883,640	$2,629	$15.33	$15.85	$116.25	% 3.327
1873	56	9,313,456	1,037,190	2,553	16.72	17.27	115.60	3.668
1874	50	7,277,000	1,777,640	2,498	18.99	19.39	117.93	6.446
1875	45	5,746,700	1,073,311	2,481	20.55	20.98	117.76	3.799
1876	38	5,176,500	1,106,426	2,458	22.96	23.47	117.65	4.148
1877	34	4,266,500	1,211,945	2,458	24.93	25.48	118.40	4.437
1878	34	4,950,500	1,130,352	2,416	26.60	27.29	118.99	3.732
1879	31	4,306,900	842,305	2,418	27.32	27.88	119.42	2.733
1880	30	3,950,500	887,412	2,425	27.79	28.32	120.66	2 925
1881	29	2,950,500	669,592	2,455	27.42	27.88	120.30	2.117
1882	29	3,534,088	577,854	2,476	27.05	27.46	120.59	1.900
1883	29	4,290,500	622,915	2,499	26.37	26.75	120.51	1.805
1884	29	4,290,500	523,475	2,492	26.00	26.33	120.25	1.449
1885	29	4,290,500	387,416	2,484	25.56	25.88	121.52	0.993
1886	29	4,303,500	305,481	2,619	24.89	25.20	122.07	0.792
1887	29	4,558,500	113,135	2,661	22.26	24.07	113.85	0.264
1888	29	4,558,500	139,211	2,703	21.36	23.24	114.11	0.285
1889	30	5,108,500	198,909	2,759	20.38	22.16	114.22	0.373
1890	30	5,099,550	244,101	2,784	19.49	21.26	113.36	0.415
1891	29	6,040,500	289,558	2,758	19.36	21.22	113.33	0.459
1892	31	7,407,700	310,246	2,739	.....	21.52	114.44	0.426
1893	32	8,570,500	824,099	2,699	.....	21.54	113.63	1.074
1894	33	8,970,500	1,061,957	2,616	.....	22.68	115.25	1.337
1895	35	9,570,500	1,009,301	2,552	.....	23.71	116.26	1.176
1896	36	9,810,500	1,064,903	2.514	.....	24.72	116.58	1.159

NOTE 1.—Column of net assets to risks is compiled from New York Reports, industrial insurance being excluded.
NOTE 2.—In this column risks in force include industrial insurance.
NOTE 3.—Capital stock excluded from liability but included in assets.
NOTE 4.—These ratios equal claims resisted in Table V., divided by total claims (Table III., column 3), plus claims resisted in Table V. Claim resisted, as an amount, is overstated because of the fact that some claims resisted are carried several years. The average for the quarter century equals $18,292,374 ÷ $1,139,775,547, or 1.605 per cent.

TABLE VI.

ANALYSIS OF RECEIPTS, LEVEL PREMIUM LIFE INSURANCE COMPANIES, REPORTING TO THE NEW YORK STATE LIFE INSURANCE DEPARTMENT. Twenty-five Years, 1872–1896.

Year ending Dec. 31.	No. of Companies.	Premiums to Income.	Interest and Rents to Income.	Other Receipts to Income.	Premiums to $1,000 of Mean Insurance.	Income to $1,000 of Mean Insurance.	Income to Mean Gross Assets.	Per Cent. of Income going to the Reserve.
1872	59	82.35	15.70	1.95	46.20	56.10	36.79	33.33
1873	56	81.08	17.80	1.12	45.70	56.40	34.06	28.64
1874	50	77.28	19.84	2.88	43.80	56.70	30.97	29.81
1875	45	77.12	22.00	0.88	42.80	55.40	27.49	26.38
1876	38	74.78	24.88	0.34	39.40	52.70	23.78	20.49
1877	34	73.04	26.67	0.29	38.20	52.30	24.44	11.72
1878	34	71.13	28.49	0.38	37.70	53.00	20.10	10.36
1879	31	69.21	30.54	0.25	36.10	52.20	18.91	12.18
1880	30	69.69	29.60	0.71	36.30	52.10	18.31	14.63
1881	29	70.49	28.74	0.77	37.10	52.70	18.75	17.95
1882	29	71.12	27.10	1.78	38.10	53.50	19.36	22.13
1883	29	72.73	25.80	1.47	39.60	54.40	20.09	22.49
1884	29	74.26	25.50	0.24	39.60	53.40	20.13	20.98
1885	29	74.40	24.84	0.76	40.30	54.20	20.79	23.94
1886	29	75.86	23.31	0.83	41.80	55.10	21.58	29.62
1887	29	76.98	22.61	0.41	42.80	55.60	22.61	28.48
1888	29	77.79	21.55	0.66	43.70	56.20	23.76	29.69
1889	30	79.17	19.75	1.08	45.10	57.00	25.13	31.92
1890	30	79.79	19.17	1.04	44.70	56.10	25.85	32.43
1891	29	80.53	19.21	0.26	43.90	54.50	25.68	32.75
1892	31	80.98	18.54	0.48	44.80	55.30	25.89	31.45
1893	32	81.42	18.46	0.12	44.20	54.30	25.24	29.63
1894	33	79.93	18.72	1.35	44.70	56.00	25.31	30.69
1895	35	80.63	18.87	0.50	45.40	56.30	24.28	30.40
1896	36	80.08	19.36	0.56	45.70	57.10	23.57	28.71
1872–'96	..	77.88	21.32	0.80	. ..	....	....	27.40

TABLE VII.

ANALYSIS OF DISBURSEMENTS, LEVEL PREMIUM LIFE INSURANCE COMPANIES, REPORTING TO THE NEW YORK STATE LIFE INSURANCE DEPARTMENT. Twenty-five Years, 1872–1896.

Year ending Dec. 31.	No. of Companies.	Claims to Outgo.	Lapse Values to Outgo.	Policy Dividends to Outgo.	Policy-holders' Returns to Outgo.	Stock Dividends to Outgo.	Commissions to Outgo.	Salaries to Outgo.	Miscellaneous Expenses to Outgo.	Total Expense of Management to Outgo
1872	59	32.83	17.80	25.67	76.30	0.67	9.22	5.77	8.04	23.70
1873	56	32.23	19.74	27.15	79.12	0.52	7.73	4.98	7.65	20.88
1874	50	31.76	27.64	20.46	79.86	0.46	7.31	5.01	7.36	20.14
1875	45	33.98	25.53	22.38	81.89	0.45	6.78	4.78	6.10	18.11
1876	38	33.37	27.87	21.13	82.37	0.43	6.30	4.26	6.64	17.63
1877	34	35.11	25.77	20.71	81.59	0.48	4.88	4.19	8.86	18.41
1878	34	40.42	23.70	20.29	84.41	0.35	4.26	4.09	6.89	15.59
1879	31	44.80	18.99	19.93	83.72	0.41	5.06	4.09	6.72	16.28
1880	30	45.44	14.77	20.18	80.39	0.49	5.91	4.76	8.45	19.61
1881	29	47.51	13.04	19.31	79.86	0.39	6.87	4.97	7.91	20.14
1882	29	45.03	13.97	20.46	79.46	0.41	7.70	5.19	7.24	20.54
1883	29	47.24	12.34	18.70	78.28	0.41	8.24	5.25	7.82	21.72
1884	29	46.46	12.40	17.02	75.88	0.42	8.82	5.33	9.55	24.12
1885	29	48.13	12.00	16.15	76.28	0.40	9.71	5.58	8.03	23.72
1886	29	46.50	11.46	16.06	74.02	0.39	11.58	5.90	8.11	25.98
1887	29	45.83	11.14	15.90	72.87	0.35	12.91	5.93	7.94	27.13
1888	29	46.99	10.87	13.86	71.72	0.32	14.05	5.87	8.04	28.28
1889	30	46.36	10.69	12.19	69.24	0.29	15.96	5.95	8.56	30.76
1890	30	46.28	10.92	11.27	68.47	0.26	16.43	5.92	8.92	31.53
1891	29	46.20	11.95	10.30	68.45	0.36	15.75	6.07	9.37	31.55
1892	31	47.47	10.24	9.41	67.12	0.39	15.99	6.64	9.86	32.88
1893	32	45.58	11.91	8.90	66.39	0.46	16.24	6.91	10.00	33.61
1894	33	44.03	13.02	8.20	65.25	0.41	16.78	7.69	9.87	34.75
1895	35	45.64	12.32	8.23	66.19	0.40	16.04	8.38	8.99	33.81
1896	36	45.57	13.24	8.58	67.39	0.40	14.83	8.05	9.33	32.61
1872–'96	. .	43.52	14.76	14.61	72.89	0.41	12.07	6.08	8.55	27.11

TABLE VIII.

RATIOS, SUGGESTIVE OF THE SURPLUS FACTORS, LEVEL PREMIUM LIFE INSURANCE COMPANIES, REPORTING TO THE NEW YORK STATE LIFE INSURANCE DEPARTMENT. Twenty-five Years, 1872–1896.

Year ending, Dec. 31.	No. of Companies.	Death-claims to Mean Policies.	Claims Paid to Mean Insurance.	Death-claims to Mean Insurance.	Management Expenses to Mean Insurance.	Management Expenses to Premium Income.	Interest to Mean Gross Assets.
1872	59	(1) 1.10	(2) 1.23	(3) 1.21	(4) 0.886	(5) 19.19	5.78
1873	56	1.20	1.30	1.31	0.841	18.40	6.06
1874	50	1.06	1.26	1.19	0.801	18.30	6.14
1875	45	1.17	1.39	1.29	0.740	17.30	6.05
1876	38	1.13	1.40	1.28	0.739	18.75	5.92
1877	34	1.16	1.59	1.28	0.831	21.74	5.72
1878	34	1.23	1.92	1.37	0.740	19.64	5.73
1879	31	1.22	2.05	1.40	0.746	20.66	5.78
1880	30	1.27	2.02	1.41	0.872	24.03	5.42
1881	29	1.34	2.05	1.50	0.870	23.44	5.39
1882	29	1.29	1.88	1.42	0.856	22.49	5.25
1883	29	1.33	1.99	1.45	0.917	23.16	5.18
1884	29	1.26	1.96	1.37	1.017	25.67	5.13
1885	29	1.31	1.98	1.45	0.978	24.25	5.16
1886	29	1.26	1.80	1.38	1.008	24.11	5.03
1887	29	1.31	1.82	1.39	1.080	25.21	5.11
1888	29	1.32	1.86	1.43	1.117	25.57	5.12
1889	30	1.25	1.80	1.32	1.193	26.46	4.96
1890	30	1.29	1.76	1.34	1.195	26.71	4.96
1891	29	1.34	1.69	1.29	1.157	26.34	4.93
1892	31	1.28	1.80	1.39	1.247	27.83	4.80
1893	32	1.23	1.74	1.34	1.285	29.04	4.66
1894	33	1.15	1.71	1.27	1.348	30.13	4.74
1895	35	1.18	1.79	1.31	1.325	29.18	4.58
1896	36	1.17	1.85	1.33	1.327	29.03	4.56

NOTE 1.—The term "Death-claims," or claims by death, refers to number of policies. The Ratios for 1872-'77 include claims by death and maturity.
NOTE 2.—The term "Claims Paid," include claims by death and maturity as endowments.
NOTE 3.—The term "Death-claims" in this column refers to claims by death incurred.
NOTE 4.—Management Expenses refers to all disbursements other than to policy-holders.
NOTE 5.—The average for the quarter century is $698,734,746 ÷ $2,764,394,219, or 25.27 per cent.

Note upon the Legal Ratio of 15½.

(*In Coinage of Silver.*—Ed.)

BY M. LEON WALRAS, UNIVERSITY OF LAUSANNE, SWITZERLAND.

[Taken from the "Journal des Economistes" of December, 1876.]

Translation by Howell W. St. John.

Preface.

The translator of the following essay by Prof. Walras was requested to prepare a review of President McClintock's address—delivered at the previous autumnal session (October 8th, 1896)—to be presented as a part of the discussion pertaining to the exercises of the annual meeting of the Actuarial Society, April 29th, 1897. In recognition of his obligations to the Society the translator offers this "note" as a substitute for personal services in discussion, with the confident belief that the Society will be greatly the gainer in consequence. He begs leave to submit the opinion that this essay is peculiarly pertinent to the occasion because it so well exemplifies the method, in exposition of economic questions, adopted by President McClintock in his valuable and instructive address—the rigorous or mathematical method.

An extract from Prof. Walras' "Geometrical Theory of the Determination of Prices" may serve to lend greater interest to this subject:

"Is it not worth while to demonstrate rigorously the fundamental laws of science? We count to-day I do not know how many schools of political economy—the *deductive* school and the *historical* school; the school of '*laissez-faire*' and the school of *state intervention or 'socialisme de la chaire'*—the *socialistic* school properly so called; the *catholic* school and the *protestant* school.

"For me I recognize but two: the school of those who do not demonstrate, and the school—which I hope to see founded—of those who do demonstrate their conclusions."

I HAVE received the last pamphlet of M. Henri Cernuschi*—"Silver Vindicated"—reproduced in the "Journal des Economistes" of the last month under the title "Remedy in the Silver Crisis. Universal Bimetallism at the ratio of 15½."

* The distinguished Italian Bimetallist, resident in Paris.

I have read it with attention as well as its antecedents, which the author has done me the honor to send me, and I am more and more convinced that, through failure to apply to the study of facts essentially quantitive, the only method which is suited to it, we leave obscure and uncertain in these questions some fundamental points which it would be possible, if we desired, to make plain with mathematical vigor.

In the 30th lesson of my "*Elements of pure Political Economy*," entitled "*Problem of the Value of Money*," I have shown that if we employ a single merchandise (*a*) as money, there will be precisely [to determine the three "unknowns,"* which will be:

1st. The quantity of (*a*) remaining merchandise;

2d. The quantity of (*a*) employed as money;

3d. The common price of (*a*) merchandise and of (*a*) money, in terms of any one other merchandise whatsoever], three equations, expressing:

1st. That the sum of the quantities of (*a*) merchandise and of (*a*) money is equal to the total quantity of (*a*).

2d. How the price of (*a*) merchandise results from the quantity of (*a*) merchandise.

3d. How the price of (*a*) money results from the quantity of (*a*) money.

I would also explain, and every man, be he never so little an economist and mathematician, would recognize for himself, by proceeding as I have done, that if we employ concurrently two merchandises (*a*) and (*o*) as money that we shall have [to determine the six unknowns,* which will be:

1st. The quantity of (*a*) merchandise;

2d. The quantity of (*a*) money;

3d. The quantity of (*o*) merchandise;

4th. The quantity of (*o*) money;

5th. The price of (*a*) merchandise and money;†

6th. The price of (*o*) merchandise and money †], only five equations, expressing:

1st. That the sum of the quantities of (*a*) merchandise and of (*a*) money is equal to the total quantity of (*a*).

2d. That the sum of the quantities of (*o*) merchandise and of (*o*) money is equal to the total quantity of (*o*).

* Variables.—T.

† The price of (*a*) and of (*o*) will be expressed in terms of some (one) other commodity (*c*), indifferently selected so far as mathematical demonstration is the purpose in view.—T.

3d. How the price of (*a*) merchandise results from the quantity of (*a*) merchandise.

4th. How the price of (*o*) merchandise results from the quantity of (*o*) merchandise.

5th. How the price of (*a*) money and of (*o*) money results together (at the same time) from the quantities of (*a*) money and of (*o*) money.

If we employ concurrently three merchandises as money we shall have but seven equations to determine nine unknowns.*

If we employ four merchandises we shall have but nine equations to determine twelve unknowns, ... and so on one after another.

Thus, in the case of the single standard the problem is completely determined and solved by itself in the market, through the mechanism of free concurrence.** The legislator has nothing to do but to designate the merchandise money (*a*) and to permit the transformation of money into merchandise when the value of (*a*) merchandise is greater than the value of (*a*) money, and but to transform for himself, if he should desire, merchandise into money when the value of (*a*) money is greater than the value of (*a*) merchandise.†

On the contrary, in the case of the double standard the problem is incompletely determined, and the legislator may intervene to determine arbitrarily one of the six unknowns, or to introduce in one way or another a sixth equation. For example, he may determine arbitrarily the quantity of (*a*) money, or the quantity of (*o*) money, or the relation of the first quantity to the second. Or, just as well, he may determine arbitrarily the price of (*a*) money, or the price of (*o*) money, or the relation of the first price to the second.‡ If he places the determination arbitrarily upon the

* Variables.—T.

** The word concurrence in the text has been translated as written ("concurrence"), to accord with the word "concurrently," used by the author.

Usually we should say that the adjustment of the price of (*a*) merchandise to (*a*) money, as explained by Prof. Walras in the next sentence, would result through free *competition*.

† It is customary to say that the legislator permits the *coinage* of the two metals (gold and silver) and not the conversion of coin into bullion, but Prof. Walras' statement has been literally translated.

‡ Have we not here an excellent instance of the method pursued by "those who *do* demonstrate their conclusions?"

We find through the "relation of the first price to the second," fixed by the legislator (the legal mint or coinage ratio—R), the missing equation ($P_o = R. P_a$), which enables us to solve the problem and to determine each of the "unknowns."—T.

quantity the value will determine itself in the market. If he places it upon the value then the quantity will determine itself through the mechanism of free concurrence.

Let us suppose that he has taken the last way, by fixing legally at 15½—as demanded by M. Cernuschi—the ratio of the value of gold money to the value of silver money; let us see then how the respective quantities of gold and silver, coined or not coined, will establish themselves in consequence.

When the figure 15½ shall be *greater* than the ratio of the value of gold merchandise to the value of silver merchandise, not only all the gold taken from the mines will be coined, but more than this, a part of the gold merchandise will be transformed into money, while at the same time, not only all the silver taken from the mines will be employed in the arts, but, beyond this, a portion of the silver money will be transformed into merchandise.

Thus the quantity of *gold money will be augmented;* that of *silver money will be diminished.* The quantity of *gold merchandise will be diminished;* that of *silver merchandise will be augmented,* and this until the ratio of the value of gold merchandise to the value of silver merchandise be raised again to 15½.

When the figure 15½ shall be *less* than the ratio of the value of gold merchandise to the value of silver merchandise the inverse phenomena will take place. The quantity of *gold money* will be diminished; that of *silver money will be increased.* The quantity of *gold merchandise will be augmented;* that of *silver merchandise will be diminished,* and this until the ratio of the value of gold merchandise to the value of silver merchandise shall be lowered again to 15½.

From these explanations it follows that the adversaries of M. Cernuschi deceive themselves when they affirm in an absolute manner that "to promise the maintenance of 15½ is to promise impossibility." This maintenance is possible within certain limits without prejudice to free concurrence.

But it follows also that M. Cernuschi himself is in error in a single point if he maintains that the ratio of 15½ being fixed as a legal ratio of the value of gold money to the value of silver money, that it will on that account alone obtain as a natural ratio of the value of gold merchandise to the value of silver merchandise, as one may infer notably from the last two pages of his pamphlet.*

A single merchandise may be money; to become money it

* See "Silver Vindicated," p. 32.

remains none the less merchandise and has (possesses) as such none the less a price determined by the law of supply and demand. This price may be exceptionally and momentarily sometimes greater, sometimes less than the price of money, and, in consequence, it may be for the advantage of the miner, to carry his metal sometimes to the market, sometimes to the mint, and for the money-broker sometimes to melt his coins, sometimes to make money of his ingots.

It is this that we see every day in the system of the single standard and in the system of the double standard. Without doubt, in the latter case the ratio of 15½ placed upon the metal money by the legislator may impose itself upon the metal merchandise through the mechanism of free concurrence, but not immediately nor always. When *greater* than 15½ the ratio of the value of gold merchandise to the value of silver merchandise is lowered *only by the demonetization of gold, and so long only as gold shall be demonetized;* after this it will maintain itself at 16, 17, 18. . . . When *less* than 15½ the same ratio is raised *only by the demonetization of silver, and so long only as silver shall be demonetized;* after this it will maintain itself at 15, 14, 13. . . . M. Cernuschi assures us—rationally or irrationally—that the actual basis of the value of silver is due to the action of law and not to that of nature, but he cannot seriously intend to warrant us that this latter action will never be exercised.

It is essential then that we understand clearly that in the bimetallic system there may occur such an augmentation of the quantity of silver that there will result the total demonetization of gold, and we shall be obliged to make our large payments with some very heavy loads; or such an increase in the quantity of gold that there will result the total demonetization of silver, and we shall be obliged to make our little payments with some extremely small coins;* that is to say, the system of the double standard upon the basis of 15½ legal, be it *local* or *universal*, is always and definitely only the system of the alternative standard, in which the depreciated metal drives more or less the non-depreciated metal out of circulation.†

* The first alternative would undoubtedly occasion great inconvenience, the second would be attended with a material risk of loss. Practically (in the business world) the retention of silver in circulation, for the purpose of small payments, is secured by the governmental action known as "debasement of the coinage."—T.

† As an historical fact, in France (under the régime of free coinage) gold commanded a premium between 1820 and 1850, silver between 1851 and 1856, and gold again from 1867 until the suspension of free coinage in 1874.—T.

May be this is only a wholly theoretical inconvenience and far removed, and may be the system of M. Cernuschi will have some immediate practical advantages. I will not examine this point here; I have desired at the present time only to point out with precision a question of principle and to illustrate by an example that readily presented itself, in what confusions we shall be involved in matters of applied political economy so long as we shall not accept the necessity—a little laborious it may be, but absolutely inevitable—to elaborate scientifically the Pure Political Economy.

Government Legislation of Holland in Reference to the Working of Life Insurance Companies.

Article presented at the International Congress of Actuaries, Brussels, September 2d–6th, 1895, by

MR. LEONARD WOLTERBEEK,

General Manager of the Nederland Life Insurance Company, Amsterdam.

THE task undertaken at the request of the Board of the International Congress of Actuaries, held in Brussels in 1895, though apparently not very arduous, is in one respect rather a difficult one.

The eighth section of the programme of the Congress demands in fact "an essay on the laws which are both enacted and proposed concerning the securities to be given by life insurance corporations as a protection to policy-holders, as well as with regard to the taxes on premium income." Such laws never having been passed nor even proposed in Holland, we would have nothing to say on the subject if strictly keeping to the letter of the said section of the programme.

Such a statement would not answer the purpose, which evidently is to be informed of the legal position of life insurance companies in Holland. It might, moreover, lead to the assumption that the great questions of social economy are neither discussed nor cared for in Holland, or that life insurance is there, so to say, conducted without law, neither of which is true.

A codification of the working and organization of life insurance corporations and friendly societies not existing we will endeavor to give a sketch of the situation which by unwritten law has naturally developed itself into a more and more definite shape.

The first attempt at any legislation in this matter, of which mention is made in the official records, is to be found in the Royal Decrees of June 16, 1830, No. 54 of the Bulletin des Lois of May 2, 1833, No. 15 *id.* of July 10, 1840, No. 14 *id.*, and of December 9, 1845, No. 69 *id.*, which set forth the requirements and formalities which have to be observed when establishing a life insurance corporation.

The principal requirement to be complied with, when applying

for a license, consists in submitting the premium tables to the approval of the Government, no authority to conduct life insurance business being granted unless the premium tables had been previously approved. It was further enacted, that a mutual company could not begin operations before the number of its members had amounted to at least five hundred.

Those who wanted to establish a limited life insurance company were absolutely at the mercy of the Government.

Section 36 of the Code of Commercial Law prescribes that a limited liability company shall not begin business until the Government has approved its charter. And again the Royal approval could not be obtained unless all the formalities and requirements imposed by the above Royal Decrees had been complied with to the satisfaction of the Government. Moreover, those who disobeyed were liable to be tried for misdemeanor.

The above Royal Decrees of 1830 also prescribed, that a list of all the life insurance companies located in the Kingdom of the Netherlands, indicating which of these had and which had not been established under the Royal approval, had to be drawn up and published by the Government.

It stands to reason, that such regulations were generally disapproved. Greatly impeding the development of life insurance they did not offer any serious guarantee of a good and conservative management.

Under this system the superintendence of the Government only took effect before the company had started. How it was administrated and managed during its existence did not seem to be considered of any moment, and still such an institution having obtained once for all the distinctive mark of the Royal approval, the public at large naturally held the Government to be responsible (morally at least) for the good management and solvency of the undertaking.

Strange to say, these Royal Decrees, which surrounded the establishing of life insurance companies (the number of which companies was very small at the time and which nobody apparently cared to establish) with so many difficulties, exempted the funeral, health and other friendly societies (of which there existed a goodly number already) from all Governmental supervision.

A quite unexpected event suddenly changed in 1880 the state of things just described. The Supreme Court, having to try a case of prosecution for non-compliance with the enactments of the Royal

Decrees, decided by its judgment of April 12th, 1880, that the said Decrees had no force of law.

The Government, though it had to submit to this verdict, nevertheless decided not to desist from its (supposed) right of supervision until the Royal Decrees should formally have been repealed, so that one practically has at present the free option of either disregarding the authority of the Government in this matter, or applying as heretofore for its approval of the premium tables.

The very foundation of the Royal Decrees having been destroyed by the judgment of the Supreme Court, the question of the legislation referring to the organization of life insurance companies and friendly associations forced itself upon the public mind as one which had to be examined without delay. Public opinion generally was in favor of repealing the existing regulations, on account of their failing in legality as well as in several other respects.

The Government appointed, on the 4th of October, 1883, Mr. W. J. van Reesema, General Manager of the National Bank of Life Insurance of Rotterdam; Mr. A. J. van Pesch, Professor of Mathematics, and Mr. J. W. H. M. van Idsinga, Chief of a Section of the Department of the Interior, as a committee to make suggestions for the drafting of a bill regulating the working and organization of life insurance companies and other institutions of a similar kind.

On the 15th of May, 1885, the said committee submitted to the King its report, to which it added the draft of a bill. It recommended as a fundamental principle of the legislation in this matter, that any one who might wish to establish a life insurance or any similar institution might be at liberty to do so without having to solicit a Government license, and without having to submit to the Government for approval its charter, premium tables, or anything else, provided the requirements of the law, and the formalities it prescribes be fulfilled and observed.

As a means of checking abuses the committee recommended the publication of all accounts and reports of all such institutions to be made in the same form, any act done contrary to the law making one liable to criminal prosecution, which in fact meant the adoption of the system inaugurated by the English Life Insurance Companies Act, 1870.

The report finally proposed that the policy-holders might claim from the Court an order for winding up the company in case

its financial position should not be strong enough fully to secure their interests.

The work of reform undertaken by Government was supported by private efforts.

The Association of Dutch lawyers submitted the question at stake to its annual meeting of 1884, in this form: "Is it advisable to submit the organization and management of life insurance companies to the ruling of a special law? If so, on what basis has such regulation to be established?"

Mr. M. Th. Goudsmit and the writer of this paper, who were invited by the Board of the Association to severally prepare an elaborate opinion on the subject, both opinions being published in the records of the Association, perfectly agreed as to the fundamental principle on which future legislation had to be framed. The latter in summing up his remarks said, "What we ask in the very first place of the Legislature is liberty; what we ask next is, rules and regulations sanctioned by law which tend to prevent such liberty being abused."

Both of us agree that publicity, regulated and enforced by law with the greatest strictness, constitutes the means of efficiently preventing the companies from neglecting the interests of the policy-holders.

The Association of Dutch Lawyers, after having discussed and examined the various questions to which the subject gave rise, by a great majority concurred in the conclusions of the two said gentlemen.

The Association of General Managers of Life Insurance Companies, which was established in 1887, immediately after its constitution submitted the matter to a thorough and exhaustive examination. The result of its discussion has been given in a report made by three of its members, namely, Messrs. H. Goeman Borgesius, C. J. M. Dykmans and J. F. L. Blankenberg.

This association, which numbers among its members the general managers of all the large life insurance companies of Holland, likewise favored the adoption of the principle of liberty, provided the regular, complete and uniform publication of all the details of the administration of the companies be absolutely guaranteed by law, so as to enable the public to judge of the financial position of each company in particular.

As a means of constantly watching the position of all the institutions of the kind referred to in this paper, the Association

suggested that a permanent committee, composed of experts in life insurance selected by Government be appointed, this committee to receive also all the reports of the companies and associations and to have power to watch over and examine their financial situation in order to be able to protect the policy-holders, and to have authority to apply to the Court for an order to wind up any company the solvency of which might not be sufficiently established.

Lastly, the Association for the Promotion of the Common Weal (Maatschappij tot nut van t'algemeen) has to be mentioned, which has proved in this instance, as it has done in many others, that there is no matter of general social interest which it does not take to heart. In its 102d annual meeting, held at Amsterdam on May 23d, 1888, it passed the following resolution: "That the financial situation and the organization of the funeral, health, and other associations of a similar kind, be examined as minutely as possible by men versed in these matters, to be appointed by the Board of the Association, to which Board a report is to be submitted pointing out, if need be, the means by which the situation of the associations referred to might be improved."

To this end a committee was appointed in May, 1891, consisting of Messrs. W. L. P. A. Molengraaff, Professor of Law at the University of Utrecht; G. J. Legebeke, Professor at the Polytechnic School of Delft, and J. L. Huysinga, Engineer of Utrecht, which made an elaborate report on the subject.

The report, which bears evidence of great learning, discusses the position of the said societies in their legal and financial as well as their moral and social point of view, and enables one to appreciate much better than heretofore the great economical and moral importance of these institutions. It brings to light that no less than 423 societies insuring the cost of funerals, mutual associations of aid in case of illness and incapacity, associations of laborers and trade unions have been established in the Netherlands, with the object of supporting widows and orphans. The number of members of these associations amounts to at least 2,212,000, including children and infants. They possess an aggregate capital of five million dollars and have a yearly income of $1,800,000.

"When carefully considering the preceding facts" (exactly as stated in the report) "one is satisfied that a most important social, more especially a popular, interest depends upon the organization and the prosperity of these institutions. For this reason the Legis-

lature is not to attempt reforming these institutions after some pattern framed on theoretical grounds. The Legislature will have to abstain from imposing formalities which might, to a certain extent, impede the development of many mutual aid societies. On the contrary, it will have to devise such measures, and to use such means in its power, as are fit and likely to insure their solidity and to promote their prosperity, that these institutions may all the better answer the purpose their members had in view when establishing them."

The report, or rather, let me say, the treatise of Professor Molengraaff made a deep impression. Before the lifelike picture of these popular institutions had clearly been put before the public, no one realized the amount of vital force which called these institutions into existence, which is solely due to the efforts and energy of the inferior classes of society.

Feeling called upon by the example of private corporations to display somewhat greater activity, the Government appointed, in April, 1892, a committee consisting of Professor Molengraaff, Professor Van Geer, Mr. J. H. Schuijlenburg, Doctor Bolle, D. Simons, L.L. D., and K. H. Beyen, M. D., charged with the duty of preparing a draft for a bill regulating the organization and management not only of life insurance companies, but also of all societies formed for similar purposes.

What conclusions should be drawn from the previous remarks?

First of all, that the Government did not proceed in the same direction in which it started sixty years ago. In fact, Government superintendence proper was not established for this reason, apparently lest it would have obliged the Government to interfere with the management of the companies and thus hamper their development.

Nor was insurance especially subjected to fiscal laws nor a tax imposed upon premium income.

On the contrary, the two most recent fiscal laws, namely, those which respectively introduce the taxation of capital and that of the income, derived from the exercise of a profession, particularly favor life insurance, inasmuch as the former exempts life insurance policies from taxation as long as they have not become a claim, and the latter allows life insurance premiums up to an amount of $40.00 to be deducted from the income which is liable to taxation.

The preceding historical outline reveals another feature which is most strikingly remarkable, to wit, the desire to provide for

future wants and for widows and orphans having been felt for a long while by all classes of the population of the country stirred private energy to action, notwithstanding difficulties which arose from wrongly conceived measures that had to be overcome, and regardless of the existence or absence of legal provisions on the subject.

In point of fact, all existing institutions have been framed in one form or another sanctioned by the common law.

Did the system of very nearly unlimited liberty, which was allowed to exist until now, lead to deplorable results?

On the whole, this query may be answered in the negative. It must be acknowledged that the committee appointed by the Association for the Promotion of the Common Weal records certain irregularities it discovered in the organization or administration of some of the societies of the smaller order. But these represent financially a very small portion of the whole number.

Of the large life insurance companies established before and after 1830 there is not one whose management would have justified the superintendence of Government or any restriction upon the freedom of action of those to whom the management was entrusted.

Nevertheless, the men who are the most competent judges in this matter concur in expressing the wish that the organization of life insurance companies and friendly societies may be regulated by law. But at the same time they say that such ruling ought not to be of a kind to take away what is most essentially wanted for the prosperity of these institutions—their *freedom of action.* In their opinion the Legislature ought not to attempt anything else but to enforce the publication of all details concerning the management of the business and the company's financial situation in a way that it may be seen at a glance whether a company is solvent or not.

For a number of years already the large life insurance companies of Holland have been in the habit of publishing elaborate yearly reports, and the Association of General Managers of Life Insurance Companies does all in its power to promote such publication in a stated form, which enables one to judge of the comparative strength of each company.

The better law is that which, while taking account of the situation as developed little by little by social intercourse, does nothing but, so to say, record that result which is generally recognized as the *jus non scriptum.*

*Address of the President, Emory McClintock.

Fellow-Members of the Society,—

For the last time it is my duty to open a meeting of the Society with a presidential address. I thank you all heartily for the assistance and coöperation which during my term of office have made the duties of the President a pleasure rather than a burden. In leaving the presidency I become, like my predecessors, a permanent member of the Council, and in that capacity will endeavor, again like my predecessors, to render such effective service as may lie within my power, and so to add to the already existing evidence of the wisdom of this provision of our Constitution.

In view of the recent establishment of an examination test for entrance into the Society, it appears to me appropriate at this time to take up the subject of the actuarial profession as a means of livelihood. Our profession may be regarded from various points of view, according to the class of duties which it enables us to fulfill. Our Society, as such, is concerned chiefly in drawing our attention to the duties which we owe to our profession, to science and to posterity. It helps us also materially in various ways toward carrying out our daily duties to the companies or governmental bureaus to which our allegiance may be due. There is a third point of view, however, involving duties to ourselves and to our families, that, namely, in which the actuarial profession is considered simply as an occupation more or less remunerative. When we aid young men to come forward and enter this profession, or when we see them coming forward of their own accord, the question of their probable success or disappointment comes naturally to our minds. I have myself often been consulted by young men, or their fathers, wishing to get my opinion on this very question, and I do not doubt that every member present, even the youngest, may have had occasion to respond to similar inquiries. While I do not imagine that what I may have said on the spur of the moment to these inquiries would be of any special interest or value to other members of the Society, if now reported, it has occurred to me, nevertheless, that this subject may be of some interest to all of us,

* Not delivered at the meeting, and not, indeed, then completed, because of an accidental injury which befell Mr. McClintock not long before.

and that the opinions of an older member, prepared deliberately and with care, may be of some service, at any rate as a nucleus for thought. It is, of course, always to be remembered that any opinions expressed in a President's address to his fellow-members represent merely his own personal views, and that the Society is in no way responsible for them.

The prospect of successful and remunerative employment as an actuary interests three classes of persons: those who are considering it from without and who are yet uncertain whether or not to adopt this line of life; those who are engaged in actuarial employment without having as yet entered the Society; and those who are members of the Society.

Taking the latter class first, I can only say that to discuss in a public way with other members their own prospects of advancement would be unnecessary, if not, indeed, impertinent. If we who already have our feet on the ladder cannot estimate best our own chances and prospects, each for himself, we can learn nothing from the experience of others. Regarding now the second class, namely, those engaged in actuarial pursuits, who are not members of the Society, there is only one remark to be made. Every such person who does not regard his present occupation as a mere temporary makeshift, and who is fortunately endowed at once with youth, talent and strength sufficient to enable him to undergo the necessary course of study in addition to his regular work, should endeavor at the earliest moment to bring himself prominently forward among his fellows by passing the examinations and becoming not only an Associate, but as early as possible a Member of the Society. The only open question is that which relates to the first class, and my topic, therefore, is really confined to the sort of advice which one should give to young men of education and promise who are hesitating in their choice of a profession.

I will say at once that, rightly or wrongly, I have in every case in the past dissuaded such young men from the thought of entering our profession. You will remember that several years ago at one or two of our dinners we derived considerable amusement, as well as some serious benefit, from a series of confessions which all who were present joined in making on the subject "How I became an actuary." There were some who had deliberately taken clerkships in actuarial departments of companies, intending to rise to the top as early as possible, but these were the smaller proportion. The majority had either been called into the service almost by

chance from the outside, as happened to myself many years ago, or assumed actuarial duties in offices in which they were already otherwise engaged. Only one or two had prepared themselves in a theoretical way, by passing one or more examinations of the Institute of Actuaries, before engaging personally in actuarial work. The older members of this Society became actuaries at a time when actuaries were in demand, namely, more than a quarter of a century ago, when numerous new companies had been started, companies of which the majority have long since ceased to exist. At that time it was common enough for men to become actuaries, so to speak, by chance and from the outside, without much prior acquaintance with life insurance, though indeed usually with considerable mathematical talent and experience. Of late years such opportunities no longer occur, or at the utmost occur rarely. The number of companies employing actuaries has for a long period shown no increase. Under these circumstances it would be a matter of serious responsibility to advise any promising young man engaged in choosing a profession to make choice of ours.

The situation, in this country and Canada at least, is and long has been that a comparatively small and not increasing number of companies employ professional advisers known as actuaries, who, in some cases, have official assistants, and in almost all cases are provided with such clerical aid as their work may require. Occasionally an actuary finds promotion outside of his own department, but more usually he retains his place permanently. Vacancies occur, therefore, chiefly by death, so that important vacancies occur but seldom. When they do occur they are usually filled by promotion, not always indeed within the same company, but almost invariably within the comparatively small circle of those known to be proficient. It is now quite impossible for a young man, however capable, by any amount of study or labor, however meritorious, to make himself certain of a good position as an actuary within a given number of years from the time of beginning. He may, indeed, have his chance within a few years, but it may be long deferred or may never come at all. The same difficulty is found in increasing measure in all professions and in all lines of business, because the country is growing older and the supply of well-educated young men looking about for an opening is becoming every year more excessive in comparison with the demand for their services.

The rigid limitation of the number of companies which need

actuaries makes it peculiarly unwise for a young man to make choice of the actuarial profession in preference to others. If he chooses one of those callings in which he can open an office and gather clients together according to his ability, he is, if he have unusually good material in him, sure to succeed in the end, for it is as true now as ever that "there is always room at the top." Again, if he chooses, as more and more it is becoming customary to choose, to seek service with some kind of incorporated company, there is scarcely any class of companies in which the openings are not more numerous than in the life insurance companies, and this for two reasons: first, because there are many more companies of any other well-known kind than there are of existing life companies; and, secondly, because every other form of incorporated company includes new companies as well as old ones, and young men often have their best chances in young and growing concerns. This leads me to say a few words concerning the reason why there has not been for many years a single new life company successfully established.

The reason is to be found in the requirement by the several states, as well as by Canada, of a net reserve on a standard basis. This means that from the first and all succeeding premiums received by any company a large proportion must be set aside as reserve liability; and this makes it practically impossible for a young company to do business in competition with older ones. This regulation is maintained rigidly as regards life companies, but in consequence of it, strangely enough, there exists alongside of the life companies a large class of corporate institutions engaged more or less in the business of insuring lives, which the states have permitted to organize without hindrance and without the requirement of adequate reserves. In short, precisely because of the laws compelling life companies to hold reserves upon a basis unnecessarily rigid, other organizations of a somewhat similar nature have grown up, which began their course by avowedly and ostentatiously repudiating the very idea of the accumulation of reserves. Many of these organizations are now reaching a second stage, that, namely, in which some reserve is acknowledged to be necessary, though they have in few cases as yet appeared willing to set aside even such a reserve as the most liberal-minded actuary would recognize as the necessary minimum. As things are drifting, it is possible that, under cover of the laws which permit companies to be organized free of reserve requirements, provided only their policies are

so drawn as to permit of an increase in the premiums in case of need, new companies may before long be organized on approximately sound principles, expecting to hold and actually holding reserves above the minimum just referred to, and growing eventually into strong and well-established institutions. In this way new life companies may again actually be started, a thing which has not happened since a period now far back in the past, when the existing system of state supervision had not yet begun to accomplish its work of building up the old companies by preventing the establishment of new ones. There is no occasion at present to consider a question as to which I confess my own opinion is not clear, namely, the duty of members of this society who may hereafter be asked to aid in any such movement, or the duty of the society itself as regards the admission as members of persons connected with such possible future organizations. The fact remains at present that sound management is confined, with few exceptions, to the companies represented in this Society, and that the number of such companies is so closely limited as to afford little, if any, chance for young men seeking a profession to join a new organization.

After much reflection, I have come to the conclusion that I have erred in positively advising young men who were free to choose their own line of life to turn their thoughts away from the actuarial profession. It would, as I now think, be better to depict to them the sort of life they would have to lead and to destroy any preconceived illusions, but at the same time to tell them fairly that capacity, courage and patience may go far. To illustrate what I mean, I will close these remarks with the sort of statement which I could now imagine myself making to any expert young mathematician who might present himself having actuarial work in view.

"You must excuse me if I seem to discourage you. Your credentials are excellent, and a young man of your appearance and address, and with the capacity and education indicated by your papers, ought to be able to make a success of anything he undertakes, provided he has the requisite industry and patience.

"I am bound to tell you, however, that the number of good places is smaller in the actuarial profession than in almost any other calling upon which you might possibly think of entering. Excuse me: what were you going to say? Yes, it is a very common opinion that mathematicians who become actuaries re-

ceive greater compensation than most college professors ; but there are hundreds, if not thousands, of teachers of mathematics in this country, while there is only a small number of highly paid actuaries. This disproportion alone, when you give your mind to it, will go far to dispel the idea that your speediest road to a competence lies in our line of life. I will tell you by and by some of the special difficulties which you will have to meet if you persevere in your present idea. Let me mention by the way, however, that the social atmosphere of most college towns is such as to make it comparatively easy to live on a small income, and that the college professor gets about as much in the way of vacation at Christmas and Easter, apart from his summer vacation, as the actuary secures during the whole year.

"You must not suppose that every good mathematician can make a good actuary. This is no more true than it is that every capable actuary would make a good college professor. You are yourself well grounded in mathematics. Let me put a case to you. Let us suppose that the manufacture of helium is constantly increasing and becoming an important branch of business, employing a good many men, and that it is found to be so dangerous that, apart from the ordinary chances of disease and accident, persons employed in this manufacture stand one chance in a hundred every year of being killed in consequence of the special risk attaching to their occupation. This would naturally cause the life companies to charge an extra premium of not less than $10 for each $1,000 insured, to cover the extra risk. Now let us suppose that you were actuary of a company and were asked whether you could not meet this risk in another way, so as to avoid charging the extra $10 premium, by making a large deduction from each $1,000 insured in case the death arose by reason of the risk due to the occupation ; that is to say, instead of paying $1,000, as you would in case of death by some ordinary cause, you might deduct a large proportion of it, say $200 or $300, in case of death incurred as the result of the dangerous occupation. How would you proceed to estimate the amount of the reduction which should take place in case the death were due to the occupation? Ah, you are laughing. Well, what do you say? You would deduct the whole $1,000? Why? Because every dollar paid by the company on the extra hazard, without previous extra premium received against such hazard, is so much money given away without consideration? No one could have said it better. You have in you the making of an actuary,

because you have that particular sort of mathematical mind which seizes at once the salient point of a practical problem.

"Now let me tell you about the difficulties. You must do your studying while actually employed in actuarial work. I have no time to go into the reasons for this, but you must take my word for it. If you once get into employment you will find the work arduous and possibly exhausting. If you are not very strong you may have to give it up on that account. This work will continue daily, six days in the week, with perhaps some shortening on Saturday afternoons, and it will continue during fifty weeks in the year out of fifty-two. If you are fortunately placed you may learn something from the work which you do. Most probably, however, that work will be sheer drudgery, almost of a mechanical sort. You will have to find time alongside of this work to make yourself acquainted with the principles and practice of actuarial science, so as to fit yourself for passing the examinations. In short, you must 'scorn delights and live laborious days,' and you must have an exceptionally favorable physical and mental constitution if you are to carry it through successfully. It will require not only strength and intelligence but also unending perseverance, close attention to details, constant alacrity, quickness to see opportunities and promptness in taking advantage of them, and along with all this much of that uncommon sort of patience which enables a subordinate to work on without weariness when his superiors forget to reward or praise him, as well as to abstain from taking offense where no offense is intended.

"To begin with, it is not easy to get a foothold in a life insurance company, even at a nominal salary. For instance, there is no room for you in my company. We do not need men of your special talent, except for some special branches of work which do not employ, even in a large company, more than two or three men, and in this company we have already as many men of your class as we need. You say you would be willing to enter on a boy's salary? That would hardly do. You are no longer a boy, and you could not suitably be ranked with those much younger and less capable than yourself. It would not be comfortable for me and others over you to see you plodding along, doing the work and receiving the pay of a boy of sixteen. On the other hand, it would not conform at all with the ordinary course of things in a large office were you to come in at the bottom and be promoted rapidly above others who entered at the same time. There is no

reason, on the whole, why you should wish to enter a large office rather than a small one; or I might better say, there are reasons on both sides. What you have first to do is to find some office which happens just at this time to want a young man just like you. Whether there is anywhere just now an opening of that sort can only be found out by diligent personal inquiry. As a rule, wherever and whenever such a vacancy occurs those who enter young have always the first chance. If, among those who have begun as boys, there happens to be one possessing your natural aptitudes, he will, of course, have the first claim to any position for which you as a competent outsider would be fitted. There is, in short, just a bare chance that you may at this time find a place in one of the companies. If you find it and make the best of it, and are able to put into your work the qualities which I have indicated as requisite to ensure success, you will make your mark in the long run.

"Do not suppose that I am encouraging you to enter this line of life. I say only that if you have it in you, and if you once get a start and persevere, you may probably, almost certainly, sooner or later receive due recognition, though the chances are that it may be later rather than sooner. I will add just this: that actuaries as a class are men not only of capacity and experience, but also, so far as my knowledge goes, unusually free from jealousy, and ready to give a helping hand, whenever possible, to every clear-headed and single-minded aspirant to a place in their profession."

Abstract of the Discussion of Papers Read at Previous Meetings.

INSURANCE VALUES AS BASES FOR SURRENDER CHARGES. SHEPPARD HOMANS. Page 381, Vol. IV.

Mr. Huntington: If argument was needed to prove that the Massachusetts surrender charge for endowment insurance is both theoretically and practically inadequate for the proper preservation of the rights of the remaining policy-holders and the mutuality of any company organized under the laws of that commonwealth, Mr. Homans' essay on "Insurance Values as Bases for Surrender Charges" has certainly furnished such argument. But when Mr. Homans goes further and suggests that the term "insurance value" is at present incorrectly interpreted, and also that there is a possibility that the law is unconstitutional, I think that his statements are open to question. It is a dangerous thing for any one who is not a practicing lawyer to hazard a legal opinion. I think, however, that I am safe in agreeing with that paragraph in Mr. McClintock's letter to the Insurance Commissioner of Massachusetts, in which he states, "We know on the other hand that Mr. Wright devised a certain theory of insurance values, couched in phrases of his own, and that he was openly and urgently the author of this law in which he employed his own phraseology, already published and known to experts. The 'intent of the legislature' might be claimed to have been inspired by the known intent of the author—an intent long acted upon without dissent after the bill became a law." Upon the other legal questions I hesitate to remark except to state that I should think it doubtful if a discriminating law by any State against itself could be construed as a discriminating law against other States.

Perhaps Mr. Homans' attempt at entire and complete separation of the term and the pure endowment portions of an endowment assurance premium and liability is to an actuary as interesting as any portion of the paper, as, if the case is completely proven theoretically and practically, we should certainly make some radical change in method of handling our net insurance reserve and our yearly cost of insurance. On page 388, after dividing the formula for endowment assurance into its pure endowment and term elements, it is stated that the two separate elements are

"(1) A contract to pay the full face value of the policy in case of survival, and (2) a contract to pay the full face value of the policy in case of prior death. The company exacts full and sufficient consideration for each, and each is independent of the other. The term endowment and the term assurance might be made separately under two independent contracts in two institutions, etc. . . . The results *to the insured* would be theoretically the same."

Mr. Homans states that the points he wishes to make are (to quote rather extensively) "(1) that the net annual term insurance premium, $11.59, is intended to provide and does provide for the payment of the full face value of the policy in case of death in either one of the ten years, including the last, and (2) that the net annual pure endowment premiums, with all the accumulations thereon, are required for the integrity of the pure endowment contract."

It follows then (1) that the "Company's Insurance Risk," column 2, is $1,000 in each and every year, and not the yearly decreasing amounts as incorrectly assumed by Prof. Wright, and (2) that no portion of the reserve, column 6, can properly be used to pay any portion of the insurance. . . . "The assumption that in case of death the company pays over the self-endowment fund (net reserve) as part of the claim, and is liable for the residue only as insurance, is a fallacy. That fallacy underlies the whole theory of Prof. Wright's Insurance Values." It is then shown in proof of statement (1) that the endowment assurance premium for ten years (age at entry 40) by the ordinary formula divided into pure endowment $74.17, and pure insurance $11.59, can also be divided into two portions, one to provide for an absolute investment and the other for the yearly decreasing amount at risk. In the example used the yearly amount required to pay for the pure investment portion is $80.09, and the yearly portion for the decreasing amount at risk is $5.67. In other words, in this example, in case of death the term premium has insured what we have been in the habit of calling the amount at risk, and the amount of the investment fund is simply turned over to the beneficiary, there being no insurance feature about it. If we were making a gain and loss schedule for the year's business in which this loss occurred, the investment payment would not be mentioned at all, being simply the withdrawal of a savings-bank deposit. In the case of a loss by death in an endowment assurance, according to Mr. Homans' theory, the pure endowment

reserve would appear as gain by death while the loss by death would figure as the whole $1,000. But the net loss to the company is the same, viz., the amount at risk. And this Mr. Homans admits would, under the theoretical standard adopted, be the case, and then transfers himself from the theoretical to the practical by saying, "but it by no means follows that this is in all respects true practically."

The statement that the insurance liability is not practically in all respects the difference between face and reserve, Mr. Homans proceeds to illustrate by an example of A, who bets $1,000 with B that a certain horse will win a race. Subsequently he makes another and independent bet with C of $900, that the same horse will not win. The horse does not win. A's liability is not $100, but $1,000, *because C is not necessarily good*, and for no other reason that I can see. The necessary deduction is that Mr. Homans thinks that the bets are made with different departments of the company, and that perhaps one part of the company will be good and another part bad. And by reference to the Charter Oak in the next page, though used for another purpose, it would seem that this is what the author does think. And theoretically I am not prepared to dispute it. Practically it cannot be so.

The bets are, of course, not made with B and C nor with the investment part and insurance part of the insurance company, but with the company. In many cases the company would refuse to make one bet without the other. In the case of a man aged forty, whose family history showed a tendency to breaking down and death at, say, age 55, the company would be willing to make both bets and issue a ten-year endowment assurance simply because they could, if necessary, use the endowment portion to pay the loss, should that occur. Therefore, when Mr. Homans states that "while the net insurance liability is the difference between the face value of the policy and the reserve or self-endowment under the theoretical standard adopted, *it by no means* follows *that this is in all respects true practically*," I should be inclined to disagree with his latter clause. If we are to pursue this idea of separation to its logical end, we shall have to reconstruct our valuation tables and our methods of ascertaining the yearly cost, and, worse than all, there must be something incorrect about the contribution formula which contains the guilty creature,

$\frac{d'_{x+n}}{l'_{x+n}}(1-H_{x+n+1})$, where H equals not the amount of 80.09 per annum at four per cent. interest, but the reserve.

Mr. President, I think it is *practically* unproven that (1) the "Company's Insurance Risk" is $1,000 in each and every year and not the yearly decreasing amounts as assumed by Prof. Wright, and (2) that no portion of the reserve, column 6, can properly be used to pay any portion of the insurance.

On page 409 the question of first year's expenses is entered upon both in its relation to net valuation and to surrender values. This opens up the question of just how much new business is worth to the old members of a company. Certainly those members who come in at a large expense and withdraw at the end of two or three years with a cash value of larger amount than their premiums, less expense, accumulated at four per cent., and without any deduction whatsoever on account of contributions to the mortality cost of the other members, are a positive loss to the company. However, the problem of the amount of reserve to be held as a liability at the end of the first year's business is one which I should prefer not to commit myself on without further study of the subject. At present, however, the fact that the first year's expenses are more than the loadings on the premiums does not seem to me to lessen the company's theoretical liability on account of any policy. If new business is needed for the security of the older members and must be bought at market rates, the older members must pay for it. The fact that the company paid more for it than the loading does not lessen the theoretical liability, whatever that may be. Logically and under the theoretical standard adopted I think the net reserve is the proper liability. Any return to gross valuations, as suggested, seems to me to be a confession of weakness and one which I should be sorry to see made.

I think the thanks of every insurance man in the country are due to Mr. Homans for the interest which he has excited and the light he has thrown on this sadly beclouded subject of surrender charges. Competition, coupled with bad laws, has certainly carried many of us further in liberality to the deserting policy-holder than sober judgment would alone have led us. I hope the time is at hand when there may be a reform all along the line.

Mr. Sprague: The main point of criticism of Mr. Homans' valuable paper touches his treatment of endowment assurances and simple endowments. He would make a distinct and separate surrender charge for the endowment portion, based upon reserves instead of future net (or cost) premiums. This leads to the same

"anomaly" in result which he complained of in Professor Wright's method. On reference to his Table No. 6, it will be seen that the charge so computed is smallest at the end of the first year, when it should be largest; larger at the end of the ninth year than at the end of the first; and at the end of the sixth year (when three-fifths of the total gain or profit of the contract have been realized by the office), is more than three times that at the end of the first year. Any equitable surrender charge will be largest at the outset, and will decrease in regular gradation year by year to the close, as the profits of the contract are realized from premium payments. The anomaly arises from dealing with reserves instead of future premiums. The net premium reserve and the value of future net premiums are always the complementary parts of the net single premium, in any year of a policy's duration. And the same rate of profit contemplated at the outset, in computing the premium, if assessed upon the value of the unpaid net premiums, will give the present value of the unrealized portion of the total profit, on any kind of policy. When all premiums are paid all the profit is realized, and the equitable surrender value (payable in insurance) is the reserve. These fundamental considerations, which seem to be indisputable, were more fully discussed in a paper read by me at the Society's meeting in October, 1892.

What is meant in that paper, as in this talk, by equitable surrender value is the value payable in prepaid assurance. No equitable consideration calls for the payment of cash for lapsed or surrendered policies, and no cash settlements should be offered—much less required by statute. Cash payments encourage surrenders, as well as what is called "adverse selection," on the part of policy-holders. The distinction between surrender values payable in prepaid insurance or payable in cash, though wide, is often lost sight of, but ought to be kept in view.

So much being premised, my notion is that the most exact and proper way to fix a surrender charge on any kind of policy is to rate it on the value of the net premiums remaining to be paid. This rate should be about the same as the rate of profit contemplated in calculating the office premium, and is as easily and as correctly applicable to an endowment assurance contract as to a whole-life policy. The rate, of course, will vary as widely as the varying forms of contract. No fixed rate can be applied to differing contracts without doing injustice either to the policy-holder or to the insurance company. There is this advantage inherent in

the method which I advocate, that, for any particular contract, the rate will be constant throughout its entire duration. Again, when the office settles a premium-paying policy on this plan it realizes the total profit of the contract, in the average, as fully as if the contract should run its course to maturity in its original form.

Among the letters on this subject addressed to the Insurance Commissioner of Massachusetts by members of this Society, I note one from Mr. Charlton T. Lewis, in which he proposes a form of statute which he considers "in harmony with the principles of the common law of contracts," as follows:

"Whenever any policy of life or endowment assurance hereafter issued by a domestic corporation shall become forfeit or void for non-payment of premium, then, without any further stipulation or act, such policy shall be binding upon the company for the amount of paid-up insurance which the then net value of the policy and all dividend additions thereon will purchase as a net single premium for life or endowment insurance maturing at the time and in the manner provided in the original policy contract, and such default shall not change or affect the conditions or terms of the policy, except as regards the payment of premiums and the amount payable thereon. The net value of the policy and additions shall be determined by deducting from the net single premium which would purchase such policy and additions all indebtedness to the company on account of such policy, including the present value of all future premiums contracted in such policy to be paid thereon, all such premiums and values to be computed according to the combined experience or actuaries' table of mortality, with interest at four per cent. per annum."

The scheme here proposed is, in its basic principle, precisely the same as mine. It applies to all life and endowment assurances alike, as it should (for a simple endowment is just as much an "insurance" as a life policy is); it provides for a settlement in paid-up insurance, and the measure of the surrender charge is the future loadings. The only difference between the two schemes is in the *rate* of the surrender charge. Mr. Lewis' surrender charge is the value of the entire loading of the future net premiums, whilst mine is the value of that portion of the loading which, by a liberal estimate, may be deemed profit, or gain upon cost. If one-half the loading be taken as profit, then Mr. Lewis' surrender charge is double what mine would be; if only one-third be considered profit, then his charge is three times mine, and so on. The only difference is in the resulting rate of charge. The bottom principles are identical. When all premiums are paid, the resulting

charge is the same, viz., zero. The insurance is then paid for, and there is no occasion for surrender.

There are certain expenses attached to premium-paying policies, commissions, etc., which the office is relieved of when the policies cease. Mr. Lewis' plan converts outgo into income, and gives to the office not only all the net profit there is in the contract, but, in addition, transforms expenses into profits. The plan which I favor gives to the office all the profit that it would realize if the contracts should run their full course to maturity. This, I submit, is all that can reasonably be asked, and is in perfect "harmony with the principles of the common law of contracts."

I have alluded to Mr. Lewis' plan because it is fundamentally identical with mine, differing only in the rate of surrender charge, and because it confirms my objection to Mr. Homans' method of calculating surrender charges for endowment and endowment-assurance policies.

Mr. Starr: I have but a single remark to make. I shall say nothing of Mr. Homans' paper as to its bearing upon the Massachusetts law, but in regard to the definition of insurance value I think he is entirely mistaken. I still remain loyal to the definition of insurance value given by Elizur Wright, because the net premiums and net reserves, if the policy is continued to its maturity, will just provide for the endowment and for those annual costs of insurance, the aggregate net value of which constitutes the insurance value, according to the definition of Mr. Wright.

Mr. Macaulay: Without entering on the discussion of the question of surrender charges, I would like to express my pleasure at the clear manner in which Mr. Craig * has exposed the fallacy that a whole-life policy is really an endowment assurance maturing at age 100. It is of course true, that according to one particular table of mortality, the premiums and reserve values on the two forms of policy are identical. That, however, is a mere coincidence, and even that coincidence is dependent entirely on the table of mortality adopted. If, instead of the combined table we take the American or the H^M table, we will find that the last life is supposed to drop out before age 100, and on the other hand, if we take the Carlisle table, the last life is expected to survive for several years after 100. If a person assured under a whole-life policy should happen to live to 104 or 105, the company would not be bound to pay the amount of its assurance when age 100

* Vide *Cost of Insurance*, page 30.

was reached, merely because the mortality table had incorrectly predicted that he would not live so long. A whole-life policy is a whole-life policy, and can never be correctly described as anything else, and to call it an endowment assurance is to misname it.

Mr. Homans: Mr. Chairman, having spoken so much already upon the subject of insurance values as a basis for surrender charges, I feel a delicacy in trespassing further. There are two points, however, upon which there exists more or less of misapprehension which I desire to explain.

In criticisms upon the papers which I read before this Society on April 30th, 1891, and again in October last, regarding Wright's Insurance Values and Surrender Charges, several members condemned what they were pleased to call Mr. Homans' method for determining surrender values. I desire to state emphatically that I have never, before this Society or elsewhere, published, offered or recommended any general method for determining surrender values. On the contrary, I stated in both papers above mentioned: "This whole question of Cash Surrender Values is far-reaching, and should not be subject to iron-clad statutes. It is a question which had far better be left, in general, to honorable competition, intelligent public opinion, and to the judgment of competent insurance managers, except, possibly, that safe *minimum* surrender values in paid-up or extended insurance might be established by law for all companies, and penalties might be imposed for non-payment of same, which penalties should apply to the investment, not to the insurance branch. If left to honorable competition and enlightened public opinion, the advantages to policy-holders of companies which are ably managed would be the more manifest, and no danger need be feared that surrender values will be illiberal. A successful company, with favorable mortality and ample surplus, can well afford to give more liberal cash surrender values than a company which is less fortunate in these respects, and in which it is more difficult and expensive to secure substitutes for withdrawing policy-holders. No iron-clad surrender charges for all companies can ever be satisfactory."

I sought in the papers above mentioned, first to prove that eight per cent. of Wright's so-called Insurance Values as a Surrender Charge was unequal, and in the cases of endowments, absurdly small. In this the actuaries who gave their individual opinions in response to the invitation of the Massachusetts Insurance Commissioner, which opinions are published in his last annual report,

are in accord with practical unanimity. I sought, secondly, to prove that Wright's theory of "Insurance Values," which he defined to be "the present value of the normal future yearly costs of insurance, which by its terms the policy is exposed to pay in case of its continuance," is incorrect. In this the majority of the members of this Society differ with me.

Professor Wright, has stated in explanation of his "Savings Bank" plan of life insurance, and of his method for determining insurance values, that in every level or equal annual system of premiums there are two distinct functions, viz., first, a series of annual insurances by the company always of diminishing amount in the case of whole-life or endowment policies, and, second, a series of self-insurances, or accumulations of deposits always increasing towards the face of the policy. In other words, Professor Wright claimed that under whole-life or endowment policies the insurances, or risks, borne by the company are always the yearly decreasing differences between the face values and the net reserves. This is precisely where I differ with Professor Wright. My contention is that such contracts are of a dual nature—(1) A pure term insurance risk each year of the full face value of the policy, for which the full net yearly term premium is exacted, and (2) A pure term endowment of the full face value payable only in case of survival to the limit of the table if a whole-life policy, or to the designated age if an endowment, for which the full net yearly endowment premium is exacted. In the example given in my two papers of an endowment assurance for $1,000, issued at age 40, and payable in ten years or at death if prior, the net annual premium is as follows :

Net annual term insurance premium	$11.59
" " " endowment "	74.17
" " endowment assurance premium	$85.76

I stated, "The net annual term insurance premium, $11.59, is intended to provide, and does provide, for the payment of $1,000 in case of death in either of the ten years including the last, while the net annual endowment premium, $74.17, with all interest accumulations thereon is intended to provide, and does provide, for the payment of $1,000 at the end of the ten years, provided the insured be then alive. Each portion of the contract is complete in

itself and has no *necessary* connection with the other. For almost all practical purposes, such as the determination of reserve liability, the determination of equitable shares of surplus, etc., the contract may be treated either as a single contract or as two separate contracts. The results would be alike in either case. But, in determining insurance values or normal costs of insurance, for instance, the treatment as a single contract may lead to fallacies, as was the case with Professor Wright. The correct insurance value is always the net present value of the full net yearly term premiums, and can be nothing else.

Upon the endowment part of the dual contract the net reserve, or self-insurance fund, is, strictly speaking, a self-endowment fund. It is never properly applicable to the payment of death-claims. The whole of it is needed to pay the endowments upon survivors at maturity. The assumption that in case of death the company pays over the endowment fund (reserve) as a part of the claim, and is liable for the residue only, *as insurance*, is a fallacy. That fallacy underlies the whole of Wright's theory of Insurance Values. Professor Wright's theory can be true only when the decreasing insurance and the increasing investments are wholly and absolutely independent of each other.

If the yearly insurance risks as assumed by Professor Wright were the yearly decreasing differences between the face value of the policy and the net reserves, then the average yearly term premium in the above example would not be $11.59, but $5.77 only, or rather $5.67 only if these decreasing insurances were correctly computed. The difference between these sums, $5.92, not being needed for insurance must be added to the net endowment premium, $74.17, increasing the latter to $80.09. Now, this last sum, paid annually in advance, would at four per cent. interest amount to $1,000 precisely at the end of ten years, without any endowment or contingent element whatever. Thus the whole character of the contract would be changed. Instead of an *endowment* assurance the policy contract would be an *investment* assurance. It is to this form of policy alone, which is rarely, if ever, offered by any life insurance company, that Professor Wright's Savings Bank and Insurance Value theories would apply.

These distinctions may be clearly seen by an examination of the following tabular illustration.

Example.—$1,000 payable in ten years, or at death if prior. Age at issue, 40 years. Net annual premium, $85.76, actuaries' four per cent.

	Wright's Plan.			Wright's Plan Corrected.			Investment Assurance.		
Year of Policy.	Insurance Risks borne by the Company	Normal costs of Ins'nce Av. $5.77.	Insurance. Values.	Insurance Risks borne by the Company	Normal costs of Ins'nce Av. $11.59.	Insurance Values.	Insurance Risks borne by the Company	Normal costs of Ins'nce Av. $5.67.	Insurance Values.
1	$920.34	$9.17	$46.46	$1,000	$9.96	$93.29	$916.71	$9.13	$45.69
2	836.84	8.54	39.18	1,000	10.20	87.57	830.05	8.47	38.42
3	749.31	7.85	32.21	1,000	10.48	81.33	739.95	7.75	31.47
4	657.46	7.11	25.63	1,000	10.82	74.50	646.32	6.99	24.95
5	561.13	6.31	19.47	1,000	11.25	66.98	548.85	6.17	18.89
6	459.99	5.40	13.84	1,000	11.74	68.65	447.54	5.26	13.38
7	353.74	4.37	8.89	1,000	12.35	49.38	342.14	4.22	8.56
8	241.77	3.14	4.76	1,000	13.00	39.02	232.50	3.02	4.56
9	124.23	1.70	1.70	1,000	13.71	27.44	113.53	1.63	1.63
10	Nil	Nil	Nil	1,000	14.48	14.48	Nil	Nil	Nil

Mr. Lewis: Mr. President, might I be permitted to say one word of explanation, with reference to the quotation from a printed letter of mine, which was made a few minutes ago? In that paper, or in anything else that I have said or written, I have had no thought whatever of prescribing or suggesting the prescription of any such thing as a surrender charge. Now, inasmuch as the very suggestion of a surrender charge involves a reference to the reserve, as if the owner of the policy had some peculiar claim upon that reserve, so-called, as a separate and independent fund, I protest against the use of the term "Surrender charge." No such term has any meaning whatever in practical business. It is a logical inference from the other logical inference from our theory of net valuations—namely, that which assigns as property, to the policy-holder, the so-called reserve upon his policy. I understand by the reserve upon a policy, simply a symbol of average. If we have a thousand policies, we can have a reserve upon them. If we have ten thousand policies, we can have a reserve upon them with considerably more fitness. But if we have one policy, the notion of a reserve upon it is simply an absurdity; and we are sacrificing, we are throwing away our science of probabilities, which is the foundation of our profession, the moment we admit such a conception as a reserve upon an individual policy. Therefore, if a policy lapses or is surrendered, it seems to me that it

ought not to be transferred at once from the ground of practical business to the ground of theoretical dreams, by the fact that a man has violated his contract. If he had held on to his contract we should have required him to pay his office premium. But by some incomprehensible magic, some perversion of intellect, growing out of the fact that this theory of net valuations has got a hold upon men until they are actually ready to talk about a reserve upon an individual policy, the moment a man fails to pay his premium it is assumed that his relations should be placed upon the theory that he never had contracted for anything else but the net premium. As practical business men we have no right to inflict upon our companies this evil, that the fact of a man's violating his contract should lead the company to relieve him, to its injury and to the injury of all those who remain and keep their contracts, by modifying the terms of his contract in his favor. Let him fulfill his contract precisely as it stands. Let him fare precisely as those who remain in the company. Let him have all the rights which accrue to him by the fact of his payments, in precisely the proportion that his payments have been made, and no more. You will find that my draft of a bill for surrender values provides for precisely that result. Not that I would bind a company not to give more, but I say that is all that any legislation has any right to impose upon a company. That is as far as the legislature can go with regard to those who keep their contracts, for it is unjust that a legislature should interfere with a company for the sake of favoring those who break their contracts, at the cost of those who keep them.

MORTALITY PREVAILING AMONG ANNUITANTS. THOMAS B. MACAULAY.
PAGE 410, VOL. IV.

MR. GORE : One or two remarks on Mr. Macaulay's article have suggested themselves to me.

It is surprising that the mortality of younger annuitants was much heavier than under the H^M Table. I have endeavored to verify Mr. Macaulay's supposition that the majority of the annuitants in this case were not self-selected, and a large proportion of them were dissipated lives. While he is probably correct, I could not learn enough on the subject to be sure.

Another striking feature of his paper was the unusually light mortality of females, especially in this country. It certainly seems that women when relieved of the burden of caring for themselves

show far better judgment than men; young men especially very often become dissipated when they have no regular occupation.

I have here a record taken from our Government Reports on Soldiers' Homes. These pensioned soldiers have an easy time of it, and it would seem as if their length of life would be up to the average, yet I find upon investigation that they spend a large part of their monthly pension for drink, and this will help to account for the heavy mortality of the table.

Mortality Among Government Pensioners in U. S. Soldiers' Homes, Fiscal Year 1895–1896.

Ages.	Pensioners Exposed to Risk.	Deaths.	Mortality per 1,000.	Ex. Mortality Eng. L. T. No. 3.
41–49	1,302	24	18.4	15.5
50–54	4,787	151	31.5	21.1
55–59	5,946	185	31.1	27.3
60–64	6,084	198	32.5	37.2
65–69	4,430	210	47.4	53.3
70–74	2,462	195	79.2	78.0
75–79	1,146	132	115.2	113.1
80–84	279	58	207.9	159.4
85–89	56	16	285.7	216.9
90–96	20	2	100.0	290.4
41–96	26,512	1,171	44.2	38.6

One of the most valuable suggestions in Mr. Macaulay's paper is the one we get from the low mortality of female annuitants. It certainly seems wise for the companies doing an annuity business to base their female rates upon some other than the Government table.

Mr. Macaulay says that his tables are "a strong argument against any system of select tables which is based upon the supposition that the effects of entrance selection extend over but a few years." Of course, we cannot use this argument in *life* tables, but the effect of an annuitant's selection would seem from the nature of the case to extend over a long period of time, as there is generally more than imagination in the expectation of a long life. So I can easily agree with Mr. Macaulay on this point.

The last paragraph of Mr. Macaulay's paper begins as follows:

"To use an assurance mortality table as a basis for the premium for a life assurance policy, and then to use the Government annuity table as the basis for an annuity contract to be issued on the same life and in connection with the assurance policy, is unscientific and unjustifiable." Suppose we insure a life and after a certain number of years the insured has the option of choosing paid-up insurance or an annuity, that very selection separates him into a class of his own. If he chooses paid-up insurance it is fair to assume that his life may be shorter than the average. On the other hand, if he chooses an annuity, he places himself in a class of longer-lived people. It would seem right, therefore, to use a different table for annuitants under these circumstances.

Mr. Hall: I think Mr. Macaulay has done a very valuable service in making this analysis of observations upon the life of annuitants. He has pointed out the very significant fact that the longevity of annuitants taken in the later ages is really much greater than the annuity tables at first glance would reveal—that after those lives have been eliminated, which entered during the younger period of life, a very different result is obtained from those who constitute the great body of annuitants. I think that Mr. Macaulay has undoubtedly conjectured the true reason for this great difference—that at and past middle life the annuitants are self-selected, and during the younger ages of life the reverse is the case. And the difference between the experience in the observations upon male and female annuitants entering younger in life, I think, is also to be assigned to a similar reason. Many young women—no doubt more in Europe than in this country—having very moderate fortunes, and not being qualified by education or inclination to add to their income through their own efforts, may very naturally be disposed to make themselves comfortable for life by investing their capital in such a way as to bring the largest income. A man, similarly placed, who had any energy or character, would be apt to retain the possession of his fortune and use his own efforts to supplement his income and bring it up to such a point as might conform to his ideas of what was needful. If annuities are taken for young men by their friends, guardians or trustees, it is rather an indication that the young men are shiftless and unable to provide for themselves.

Perhaps there is no one here whose experience with annuities, from actual observation, is as limited as mine, because there has been a comparatively small number issued by the company with

which I am chiefly connected—so small a number that the several annuitants might almost have an individual recognition; and I can readily divide them into three classes.

The first class to be mentioned, as being the largest, are women, chiefly single women, who procure annuities when past middle life. This class has shown considerable longevity.

The next group are persons of younger life, who have been provided for, perhaps, by some testamentary disposition. That class has manifested an average longevity.

The third group are those who are manifestly and confessedly irresponsible and incapable of looking after themselves, or are of such character that those who were responsible for looking after them wanted to get rid even of having personal relations with them. The mortality among that class of persons has been very heavy.

In connection with the mortality on these younger lives, it is to be noted that the number of observations is very small, so that the value of the observations on the younger lives is not equal to that for the older lives.

Mr. Sartelle: The company with which Mr. Starr and I are connected has never issued an annuity; therefore we have had no practical experience. It has appeared to us, however, that it was unwise to issue an annuity contract upon the same table upon which we wrote assurance, from the fact that during the entire history of the company its mortality has been very much below the table now used as a standard for valuations, and upon which all our calculations are based. We had considered this matter in a certain preliminary manner, and had made out a table and commutation columns on the basis of two-thirds of the mortality of the Actuaries' table. It was thought that it would probably be safe, with some modifications, to adopt that as a basis upon which annuities might be issued. I have been extremely interested in Mr. Macaulay's paper, and I have felt that personally I have owed a debt of gratitude to him.

Mr. Macaulay: There are just two points that I would like to refer to very briefly—those which were raised by Mr. Gore.

In the paper, I stated that the facts brought out by the annuity experience were a strong argument against any system of selected tables which is based on the supposition that the effects of entrants' self-selection extend over but a few years. My reason for that statement is simply that the experience among annuitants shows

that persons who took out annuities early in life showed a very different rate of mortality late in life, from those who took out annuities later in life, although the current age might have been the same. In other words, the experience showed that the persons who took out annuities between twenty and thirty or between thirty and forty had a particular character as regards mortality, which extended not only during the first few years of the annuity experience, but during the whole course of that experience, and that the rate of mortality prevailing at age sixty to seventy, for example, among persons who took out annuities between twenty and thirty or thirty and forty, and those who took them out between fifty and sixty, was not the same. Now that, as Mr. Gore says, is not of itself sufficient to prove that the same thing is true of assurance mortality. But it proves it so far as the annuity experience goes, it is true, and as we saw, a couple of years ago, in a paper where I analyzed the experience of the English and American companies on assured lives, the same thing is true of assured lives, when we investigate the experience on assured persons. We find, therefore, that the annuity and the assurance experiences agree on that point, and that if we assume that the mortality is alike among persons of the same present age, though covered by policies or annuity bonds in force for varying durations, from four or five years upwards, we will make a mistake.

I would like to refer to the criticism of my statement that to use an assurance mortality table as a basis for the premium for a life assurance policy, and then to use the Government annuity table as the basis for an annuity contract, to be issued on the same life and in connection with the assurance mortality, is unscientific and unjustifiable. The kind of contract I had in mind when making that statement was not such a one as Mr. Gore refers to, but one that has been issued by a number of companies in England especially, by which an immediate annuity is issued in combination with a single-payment assurance policy.

PRESIDENT McCLINTOCK'S ADDRESS. COINAGE OF SILVER DOLLARS OF THE PRESENT WEIGHT.

PAGE 472, VOL. IV.

MR. STABLER: After the many contradictory and unsupported statements made during the last political campaign with regard to the results to follow the free and gratuitous coinage of silver, if adopted by this country alone, it was, indeed, delightful to have the

privilege of reading and studying President McClintock's able and unique address, investigating, on certain reasonable assumptions, the relative changes in the value of gold and silver bullion that were to be looked for. I was interested in making a modification of his formula, omitting his assumption that new issues of paper money should exactly replace the present overvaluation of silver and paper money considered on the silver basis. This was done, as suggested by him, at the bottom of page 478.

Letting r represent the present gold value of the bullion in a silver dollar; c, the nominal value of the coined silver and uncovered paper now in circulation; and p, the nominal value of new paper money to be issued; we have for the future bullion value of a silver dollar in present gold values, $ry=\frac{rs}{s-e-(1-r)c+rp}$, or using the values adopted by Mr. McClintock, including $r=.50$,

$$ry=\frac{1228}{1501.5+\frac{1}{2}p}.$$

If we put $p=o$, or suppose that no paper money is to be issued, we get about 82 cents in present gold value as the new value of the silver dollar. If we wish to determine p, so as to make the future bullion value of the silver dollar equal to that of the gold dollar, found by Mr. McClintock to be 92 cents, we put $\frac{1228}{1501.5+\frac{1}{2}p}=.92$, and solving the equation we obtain $p=-333$ approximately. Or, in other words, on the assumptions made, the bullion values of the gold and silver dollars would not be the same, unless capital should be used to purchase bullion to replace the depreciation in exchange value of our silver money (including paper money on a silver basis), and also to cancel 333 millions of the 383 million dollars of our uncovered paper money, using the figures in the United States Treasury circular referred to by Mr. McClintock.

Of course, these two examples are mentioned only as illustrations of the working of the formula, for if free coinage had been adopted it is not at all likely that new issues of paper money could have been prevented, and still less likely that it would have been possible to decrease largely the volume of paper money now in circulation.

Vide note upon Legal Ratio of 15½, page 61.

International Congress of Actuaries, 1898.

The following letter was received before going to press with No. 17 of Papers, etc.:

INSTITUTE OF ACTUARIES.

STAPLE INN HALL,
HOLBORN, LONDON, W. C.,
25th June, 1897.

DEAR SIR:

We have the honour and pleasure of addressing you with reference to the Meeting of the Second International Congress of Actuaries, which is to be held in London in the year 1898 under the auspices of the Institute of Actuaries of London.

The Institute have appointed an Organising Committee, and we are instructed to inform you that the date fixed for the opening Meeting of the Congress is Monday, the *16th May, 1898*, and the Meetings will continue to be held on the four following days.

We are to express the hope of the Organising Committee that the Council of The Actuarial Society of America will nominate not less than two Delegates to officially represent their Society at the Congress; that many Members will feel disposed to contribute papers on subjects of close interest to the Actuarial profession; and that they may find it convenient to be present in London on the occasion, and thus promote the success of the gathering by their active co-operation.

We send particulars as to Membership of the Congress, with other information, and shall be very glad to learn in due course the names of the Delegates your Council may be pleased to nominate.

We are, Dear Sir,
Yours faithfully,
FRANK B. WYATT,
A. F. BURRIDGE,
Honorary Secretaries.

The Secretary,
Actuarial Society of America,
New York.

INTERNATIONAL CONGRESS OF ACTUARIES, 1898.

The Second International Congress of Actuaries is to be held in London, in 1898. The meetings have now been fixed for May 16, 17, 18, 19 and 20, and the Council of the Institute has appointed an Organizing Committee to make the necessary arrangements.

It has been resolved that membership of the Congress shall be limited to

(1) Members of the Brussels Congress of 1895, and Members of the Permanent Committee of Actuarial Congresses.

(2) Fellows, Associates, and Corresponding Members of the Institute of Actuaries.

(3) Fellows of the Faculty of Actuaries in Scotland, and members of that body of analogous rank to the Associates of the Institute.

(4) Members of Actuarial Institutions in the Colonies and Foreign Countries of analogous rank to Fellows and Associates of the Institute of Actuaries.

(5) Actuaries and Assistant Actuaries of all Life Offices, and Government Actuaries and Statisticians, in the United Kingdom, the Colonies, and Foreign Countries.

(6) Members of the Council of the Royal Statistical Society.

While membership is to be restricted in accordance with the above rules, yet, that no one with a real claim to membership should be excluded, it has been arranged that the Organizing Committee will specially consider the application of any person well recommended by one qualified under the rules to be a member.

The subscription for membership has been fixed at £1.

The Organizing Committee invite Colonial and Foreign Governments, and Actuarial Institutions in the Colonies and Foreign Countries, to nominate delegates, qualified under the rules, as their official representatives at the Congress. They also invite the contribution of papers, suitable to be read and discussed at the

Congress, such papers to be sent to the Honorary Secretaries of the Institute of Actuaries not later than the end of February, 1898.

The official language of the Congress will be English, but papers may be written in French or German. So far as possible, papers should be type-written.

At the first Congress, held at Brussels, in September, 1895, a Permanent Committee was established, one of the principal functions of which was intended to be to co-operate with the Organizing Committees in the preparation of the work of future Congresses. The following are the Constitution and Bye-Laws of the Permanent Committee, together with the names of the present office-bearers and members of the Executive Council:

CONSTITUTION AND BYE-LAWS OF THE PERMANENT COMMITTEE OF INTERNATIONAL ACTUARIAL CONGRESSES.

ART 1.

The Permanent Committee of International Actuarial Congresses is established to be a bond between the Actuaries and also the Associations of Actuaries of various countries. Its head-quarters are at Brussels.

ART. 2.

It has for objects:

1. To originate and to follow out all works or researches interesting in the science or in the practice of the Actuary.

2. To publish periodically a Journal: (*a*) bringing together all information, technical, legislative, statistical or juridical, bearing upon Actuarial Science; (*b*) summarizing the publications and the works, which appear in the different countries, bearing upon Actuarial matters; (*c*) giving space, moreover, to original contributions of general interest to Actuaries.

3. To co-operate with the *Organizing Committees* in the preparation of the work of International Congresses, and in the publication of their Proceedings.

ART. 3.

The *Associate* members of the Permanent Committee shall be all those who are admitted by the *Executive Council*, hereinafter defined, and who undertake to pay an annual minimum contribution of 10 frcs.

The *Donation* members shall be those Associate members who undertake to pay a minimum annual contribution of 50 frcs. Their names shall be published each year in the Journal with a memorandum of the sums paid by them.

Associate Life members shall be those of the Associate members who have compounded for their annual subscriptions by a minimum payment of 200 frcs., made in instalments during one or two years at the most.

Donation Life members shall be those Donation members who have compounded for their annual subscriptions by a minimum payment of 1,000 frcs., made in instalments during one or two years at the most.

Public (Governmental) Departments of the different countries, Assurance Companies, and generally all Institutions, Societies or Associations, having for their object the study, or the practical application of thrift and Social Economy, may become Associate members or Donation members of the Permanent Committee.

The Associate members and the Donation members shall receive free the Journal of the Permanent Committee.

ART. 4.

The Permanent Committee shall be governed by an International *Executive Council*, consisting of 40 members, and including the 33 members who were appointed by the first International Congress of Actuaries at its meeting of 6th September, 1895, and such members as shall be in future elected by the Executive Council itself, proceeding by co-option.

Each country possessing Actuaries shall be, as far as possible, represented on the Executive Council by one or several members.

The members of the Executive Council shall be elected for 4 years, and shall be eligible for re-election.

The re-election shall take place each year, and by one-fourth of the members of the Council. During the transitional state the members to retire in 1897, 1898 and 1899 shall be decided by lot.

The election shall be made by those members not retiring, and it can take place by correspondence.

ART. 5.

Each year the Executive Council shall choose from among its own members a *Bureau*, consisting of a President, 7 Vice-Presidents, a General Secretary, a Treasurer and 7 Secretaries, distributed, as far as possible, among the members representing the different countries.

The Executive Council may, moreover, nominate correspondents whose duty it shall be to represent it in those countries where it is not represented by any member of the Bureau. The election of the Bureau may take place by correspondence.

ART. 6.

The Executive Council shall meet at the head-quarters of the Permanent Committee, and shall be convened by the President, or, failing him, by the General Secretary.

Notice of meeting accompanied by a detailed agenda shall be sent to each

member of the Executive Council at least one month before the date fixed for the meeting. Those members who find themselves unable to attend at a meeting may send to the President their views on the questions on the agenda.

In case of urgency the President and the General Secretary may take such steps as may be found necessary, provided always that they submit them at the earliest possible moment for ratification by the Executive Council.

Decisions of secondary importance may be taken without convening a meeting of the Council, on the vote of an absolute majority of the members of the Executive Council, given by correspondence on the invitation of the President.

Ten members of the Executive Council shall form a quorum. If this number be not present at a meeting, the President may take a vote by correspondence as explained in the last preceding paragraph.

The Executive Council may authorize those members who, on account of the distance of their residence, are unable to send in their views by correspondence within one month, to be represented, for the purpose of voting, by European members of the Council.

In case of equality of votes, the President shall have a casting vote.

ART. 7.

The place and date of each International Congress shall be fixed either by the last preceding Congress, or, failing that, by the Executive Council, which in such case shall be guided by the convenience of the Actuaries of the different countries interested, and by the advice of the Societies of Actuaries established in those countries. The Executive Council shall establish in the country designated, an *Organizing Committee*. The Organizing Committee shall prepare a programme of the business in concert with the Executive Council. It shall defray all expenses of the Congress, and of publishing its proceedings.

During the period in which the International Congress is being organized, two members of the Organizing Committee of such Congress shall be temporarily added to the Executive Council, and shall have the same powers as the ordinary members.

ART. 8.

The income of the Permanent Committee shall consist:

1. Of the contributions of its members;

2. Of the subsidies that may be granted to it by public (Governmental) departments of the different countries;

3. Of the subsidies which may be granted to it by the different Institutions, Societies or Associations;

4. Of the interest on its invested funds; and

5. Of sundry receipts.

ART. 9.

There shall be formed a Reserve Fund, into which shall be paid:

1. The sums received in commutation of subscriptions;

2. The contributions and subsidies made on the condition that they shall be placed to the Reserve Fund; and

3. Such sums as the Executive Council shall think wise to carry to the Reserve Fund.

The Reserve Fund shall be invested in the public debt of Belgium. It cannot be trenched upon except by a formal decision of an International Congress taken on the motion of the Executive Council. The income derived therefrom may be applied to defray the ordinary expenses.

ART. 10.

The present regulations cannot be altered except by a future International Congress on the motion of the Executive Council or at the request of 25 members of the Congress. In this latter case the proposal must be communicated to the Executive Council at least one month before the date fixed for the opening of the Congress.

ART. 11.

With the formalities prescribed in the last preceding article, any future International Congress may, by a majority of two-thirds, at least, of the members present, dissolve the Executive Council, and dispose of the available capital, as also of all documents, works, and sundry archives, belonging to the Committee.

OFFICERS AND COUNCIL.

President:	*General Secretary:*	*Treasurer:*
MR. O. LEPREUX.	MR. AM. BÉGAULT.	MR. L. DUBOISDENGHIEN.

Vice-Presidents:

Germany	MR. J. KARUP.
Australasia	" R. TEECE.
United States and Canada	" E. MCCLINTOCK.
France	" P. GUIEYSSE.
United Kingdom	" T. E. YOUNG.
Holland	" M. C. PARAIRA.

Secretaries:

Germany	MR. GROSSE.
Australasia	" J. H. RICHARDSON.
United States and Canada	" I. C. PIERSON.
France	" LÉON MARIE.
United Kingdom	" F. B. WYATT.
Italy	" G. TOJA.

MEMBERS OF THE EXECUTIVE COUNCIL.

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Mr. Gerkrath. Mr. Grosse. Mr. J. Karup. Mr. K. Samwer.

Australasia :

Mr. J. H. Richardson. Mr. R. Teece.

Belgium :

Mr. H. Adan. Mr. Am. Bégault. Mr. L. Duboisdenghien.
Mr. O. Lepreux.

Canada :

Mr. T. B. Macaulay.

United States :

Mr. E. McClintock. Mr. I. C. Pierson. Mr. H. W. St. John.

France :

Mr. E. Cheysson. Mr. P. Guieysse. Mr. Léon Marie.
Mr. J. Martin-Dupray.

United Kingdom :

Mr. A. J. Finlaison. Mr. G. King. Mr. J. Meikle. Mr. G. H. Ryan.
Dr. T. B. Sprague. Mr. T. E. Young. Mr. F. B. Wyatt.

Italy :

Mr. L. Perozzo. Mr. G. Toja.

Holland :

Mr. M. C. Paraira. Mr. E. W. Scott. Mr. L. Wolterbeek.

Russia :

Mr. S. de Savitch. Mr. R. Penl.

Sweden :

Mr. A. Lindstedt.

Switzerland :

Mr. H. de Cérenville.

Abstract from the Minutes of the Annual Meeting of the Actuarial Society of America, held in New York, on Thursday, April 29th, 1897.

FIRST SESSION.

Directors' Room, Metropolitan Life Insurance Company,
Thursday, April 29th, 1897, 11 A. M.

The meeting was called to order by the Vice-President, Mr. Bloomfield J. Miller, who expressed regret that the President, Mr. Emory McClintock, had met with an accident and could not be present, but hoped that the address which he had been preparing would be completed and printed in the minutes.

Vide page 74.

Officers and members present at roll call and during the session :

Officers and Council—Bloomfield J. Miller, 1st Vice-President ; George W. Phillips, 2d Vice-President ; Israel C. Pierson, Secretary ; Oscar B. Ireland, Treasurer. Other Members of Council—Sheppard Homans, David P. Fackler, Walter C. Wright, William McCabe, Chas. A. Loveland, William E. Starr. Members—David G. Alsop, John J. Brinkerhoff, James M. Craig, John K. Gore, Clayton C. Hall, Robert G. Hann, Augustus F. Harvey, Charles Hildebrand, John M. Holcombe, George W. Hubbell, Robert W. Huntington, Jr., Charles N. Jones, George H. Kirkpatrick, James M. Lee, Charlton T. Lewis, John B. Lunger, Thomas B. Macaulay, William C. Macdonald, Elbert P. Marshall, William A. Marshall, James W. Mason, Hiram J. Messenger, Sydney N. Ogden, Maximilian H. Peiler, Gardner L. Plumley, Charles G. Reiter, George F. Salter, George W. Sanders, Frank Sanderson, Edward J. Sartelle, William S. Smith, Joseph H. Sprague, Edward L. Stabler, John Tatlock, Jr., George Wegenast, Archibald A. Welch, William D. Whiting, George B. Woodward, Peter T. Wright.

On motion of Mr. Loveland, seconded by Messrs. McCabe and Fackler, it was resolved that the Society tender to the President, Mr. Emory McClintock, sympathy in his recent accident, with wishes for a speedy recovery, and that this action be telegraphed immediately to the President at his home in Morristown, N. J.

A reply was soon received from the President, who expressed grateful appreciation and presented best wishes for a most successful meeting.

The minutes of the meeting of October 8th and 9th, 1896, were approved as printed.

A summary of the business transacted by the Council was presented by the Secretary and approved.

On the unanimous recommendation of the Council the Society, by unanimous ballot, elected to membership Mr. Thomas Emley Young, A. B., F. I. A., Actuary of the Commercial Union Assurance Company, London, Eng., President of the Institute of Actuaries.

Mr. Fackler stated that the Committee on Examination of Candidates for Membership would report at the next meeting.

The Treasurer, Mr. Ireland, made his report, which, having been audited by Mr. H. W. St. John, was approved.

Officers and members of Council were elected:

Bloomfield J. Miller, President; George W. Phillips, 1st Vice-President; Oscar B. Ireland, 2d Vice-President; Israel C. Pierson, Secretary; John Tatlock, Jr., Treasurer. Members of Council for three years, John B. Lunger and Elbert P. Marshall.

A communication was presented by the Secretary from Mr. John R. Hegeman, President of the Metropolitan Life Insurance Company, inviting the members to lunch at 1 o'clock.

Adjourned at 12.45 p. m.

SECOND SESSION.

Thursday, April 29th, 1897, 2.30 p. m.

Mr. Miller in the chair.

New papers are printed on pages 9–73.

"What Constitutes an Insurable Interest in Lives." Clayton C. Hall.

"Meech's Life Table." Howell W. St. John.

"Cost of Insurance." James M. Craig.

"Level Premium Life Insurance"—Historical Note. Joseph A. De Boer.

"Note Upon the Legal Ratio of 15½." (In Coinage of Silver.—Ed.) By M. Leon Walras, University of Lausanne, Switzerland. Translation by H. W. St. John.

"Government Legislation of Holland in Reference to the Working of Life Insurance Companies." Leonard Wolterbeek.

The members engaged in discussion of papers read at the meeting of October 8th, 1896, pp. 82–98 :

"Insurance Values as Bases for Surrender Values." Sheppard Homans.

"Mortality Prevailing Among Annuitants." Thomas B. Macaulay.

"Coinage of Silver Dollars of the Present Weight." President's Address, Emory McClintock.

The President, at the request of the Secretary, appointed Mr. Edward L. Stabler to assist him during the coming year in editing the "Papers, etc.," of the Society.

On motion, the Secretary was requested to communicate to Mr. John R. Hegeman, President of the Metropolitan Life Insurance Company, the thanks of the Society for the use of the Board room for the meetings, and their appreciation of the courtesies and hospitalities which had been generously extended to the members.

A vote of thanks was tendered to the retiring President, Mr. McClintock, for the efficient and valuable services which he had given to the Society, in his official position, during the past two years.

The Society adjourned at 5.30 p. m. until 7 p. m. at the Hotel Imperial.

Hotel Imperial,
Thursday, April 29th, 1897, 7 p. m.

The usual dinner of the Society occurred at the above-mentioned place and hour.

The newly elected President, Mr. Miller, presided and acted as toastmaster.

The Society adjourned at 11 p. m.

ISRAEL C. PIERSON,
Secretary,
21 Cortlandt St., New York.

VOL. V. NO. 18.

PAPERS AND TRANSACTIONS.

OCTOBER 7TH AND 8TH, 1897.

THE TENDENCY TO NATIONAL SUPERVISION.

E. P. MARSHALL.

THE paper of Mr. Sheppard Homans, read before the Institute of Actuaries in London on the 22d of last February, "On Governmental Regulation of Life Insurance in the United States," as well as the interesting discussion that followed, has doubtless been closely read by the majority of the members of this Society. Interest in the question of national supervision of insurance in this country is evidently growing. A few years ago it was rare to meet an insurance official or manager who would care even to seriously discuss the question. Upon being pressed for an opinion, he might reluctantly admit that a national insurance bureau at Washington would be of advantage to the business, yet would be inclined to view it as one of those Utopian schemes that would be impossible to realize. Recent events, however, indicate that the question is one to receive, in the near future, serious attention from those who have the direction of insurance affairs in this country.

Agents' associations, as well as the journals devoted to insurance throughout the country, among which the journal published at Washington, D. C., has been conspicuous, are earnestly discussing the subject, recognizing it as a live question, and one of the State officials in charge of insurance contends that national supervision is the only relief for the flagrant evils of State supervision. Commissioner Fricke, of Wisconsin, in his last report writes as follows: "The people will never receive the full benefit of insurance, or the security it should afford, until a system of national supervision is inaugurated. Important and valuable as an insurance department should be, I fail to see how State supervision can give the results or benefits which the importance of insurance demands."

Mr. Homans in his paper has gone into the subject exhaustively from a legal standpoint and has, I think, very conclusively shown that there is no impediment in the way of Congress legislating upon the subject of insurance and enacting laws regulating the business between the States. The somewhat celebrated case of Paul vs. Virginia, so frequently quoted, after all was only a decision of the question whether the State had a right to impose a license and to regulate the admission of foreign corporations of any nature within the State. Mr. Homans in his paper says: "No case has yet held that Congress cannot regulate the business of life insurance and incidently protect the agencies by which that business can be transacted. Nor can this question ever be raised, still less be judicially decided, until Congress shall, by appropriate legislation, enact laws regulating the business of insurance. Even then the question can be brought before the Supreme Court only by a suit in which its constitutionality is questioned." The argument advanced, the citations from the decisions of the Supreme Court itself, with individual opinions from individual justices, all go to uphold the theory that Congress has the power to regulate the insurance interests of the whole country, wide and diversified as they now are. There can be no question that the policy-holders scattered all over forty-five States are entitled to a uniform, wise and stable legislation, and that it is sorely needed. The existing conflicting and discriminating laws of the various States are getting to be a burden—greater even than the long-suffering and law-abiding companies can bear.

It has been only with the display of the most consummate tact, patience and ability that the Trustees and Directors of the companies have thus far been able to manage with such rare fidelity the great interests under their control.

The growing burden of taxation, for example, that is imposed directly or indirectly upon the companies, is becoming a greater rather than a less evil. This has come about on account of State laws, reciprocal statutes, county and onerous city licenses and other fees. The tax for revenue as generally imposed is upon the gross premiums, without regard to a company's losses and expenses, or allowance for the return to the policy-holders of any over-payment of premiums in the form of bonus or dividends. The primary object now of nearly all the State insurance departments would appear to be that of revenue—not protection; to extort the largest possible sums from the companies and the people

who are prudent and careful enough to carry insurance. It has been well said: "No other business is taxed as is the insurance business, and of no other tax can so little be said in its favor and so much in condemnation."

Recently our attention has been directed to a State Board of Tax Commission—at the head of which is the Governor of the State—going a step further, by attempting to compel the holders of life insurance policies to list them for taxation along with other property. In this connection it is of interest to note a remark of Mr. Wolterbeek, in his interesting paper on "Government Legislation in Holland," Vol. V., page 72, showing how differently the question of taxation is considered in Holland. Referring to the draft of a bill by the Government of Holland regulating the organization and management not only of life insurance companies but also of all societies formed for similar purposes, he says: "Nor was insurance especially subjected to fiscal laws, nor a tax imposed upon premium income. On the contrary, the two most recent fiscal laws, namely, those which respectively introduce the taxation of capital and that of the income, derived from the exercise of a profession, particularly favor life insurance, inasmuch as the former exempts life insurance policies from taxation as long as they have not become a claim, and the latter allows life insurance premiums up to an amount of $40.00 to be deducted from the income which is liable to taxation."

There are, it is estimated, nearly twelve millions of people in the United States holding policies in the various life insurance companies and associations, and the amount involved reaches a sum the magnitude of which can scarcely be comprehended. There can be no discussion or difference of opinion upon the question that the citizens of the United States are entitled to the protection of uniform, wholesome and just insurance laws throughout the whole country, while, as it is now, the laws are burdensome, conflicting and subject to frequent changes.

Honorable John A. Finch, of Indiana, in a recent address before the American Bar Association, referring to national supervision as a remedy for the present evil, remarks:

"The impositions of the States upon insurance companies have led many to look for relief by the establishment of an insurance bureau under governmental control, and under which the companies will be licensed, subject to governmental action, with power to do business in all of the States, as free from State control as are

the national banks. This plan has a respectable support, but it will certainly require considerable legislation by Congress, and possibly a constitutional amendment, before it can be carried into effect. The American people are not favorable to the abandonment to the general government of any rights belonging to the States, and that is the main obstacle to the adoption of this plan. Certainly the cost to the people is largely increased by reason of taxes and fees imposed and by the irregular, onerous and conflicting requirements of the States. If one bureau could be created that would do the work for the insuring public that is now done by the forty-five, it would be a great saving in the matter of expenses and a more efficient supervision might be hoped for. It is notable that one of the most intelligent of the insurance commissioners now in office has declared in favor of a national bureau of insurance as an escape from the present cumbersome and cumulative system."

Efforts have been made to secure action upon the part of Congress on this subject. Its supporters have thus far been unable to show much actual progress, but are not apparently disheartened. During the first session of the Fifty-second Congress a bill to organize an insurance bureau was introduced in the House by Mr. Pattison, a member from the State of Ohio and an ardent advocate of national supervision. It may not be out of place to refer briefly to some of the points of that bill, which was entitled: "A bill to promote commerce by regulating insurance among the States."

(1) The provisions of the proposed law were not to apply to any corporation transacting the business of insurance wholly within the State under whose laws the corporation was organized, or corporations of a purely religious, charitable or benevolent character. Each State would continue to have its own department to superintend the companies organized within its own borders, but have no supervision of companies organized in other States.

(2) The bill provided for organization in the Treasury Department of a national insurance bureau—the Commissioner or chief officer of which to be appointed by the President, by and with the advice and consent of the Senate.

(3) The certificate of the Commissioner that a company had complied with the requirements of the Act gave it the privilege of transacting its business in any of the States and Territories of the United States, and subject to no regulations, imposts or taxes other than those enacted from time to time by Congress or by the State in which said company was organized.

Thus every company doing business outside of its own State would be subject to the laws and regulations of its own State and those of the National Government, but would not be subject to the laws or regulations of any other State.

(4) An annual report and sworn statement of the condition and affairs of every corporation doing business under the Act to be required on the thirty-first day of December, and it was made the duty of the Commissioner to transmit authenticated copies of every annual statement to the officers of each State charged with the enforcement of insurance laws.

Thus each company would be required to make up annually only two statements—one for the National Department and one for the Department of the State under whose laws it was organized.

(5) Expenses of the department to be apportioned to all the companies authorized to do business under the Act, according to the net assets of the company.

(6) The final section provided that it should not be lawful for any company to do business beyond the limits of the State where organized, unless it had complied with the provisions of the Act.

The Pattison bill was referred to the Committee on Interstate and Foreign Commerce, and, I believe, was never reported to the House for passage.

The majority of men who have given the subject of national supervision careful study confidently believe that Congress can and should provide for the regulation of insurance, and that the time is at hand when it should declare insurance to be a necessary part of commerce—and that the best interests of the millions of policy-holders scattered throughout the nation would be conserved by the passage of a law similar in character to the bill above referred to, or embodying its principal features.

Note on a Particular Case of Loans repayable by Instalments.

JOHN TATLOCK, JR.

THE general theory of Loans repayable by Instalments has been discussed in a very complete and exhaustive manner by Mr. Peter Gray and Mr. W. M. Makeham in certain notable papers published in *The Journal of the Institute of Actuaries*, and also by Mr. George King in his treatise, *The Theory of Finance*, published as No. 8, New Series, of the *Transactions of the Actuarial Society of Edinburgh*.

While the subject is not of especial interest to American actuaries, as there appear in this country but few issues of corporate securities in which the face of the individual obligation is payable by instalments, yet as the particular case herein discussed has been presented to the writer on several occasions for valuation, and as the expression deduced for that purpose readily admits of numerical calculation by means of the ordinary tables of the values of annuities certain, this note may possibly be of interest to others.

In the case in point it is required to find the expression for the value, on the basis of a certain effective rate of interest, of an obligation whose face is repayable in equal annual instalments, the interest on the principal outstanding at the dates when interest is due being paid semi-annually, at the nominal rate.

The notation adopted is as follows:

P=the outstanding principal at date of valuation.
n=the number of years to maturity.
m=the yearly instalment paid on account of principal.
r=the nominal annual rate of interest.
i=the effective annual rate of interest.

$$v=\frac{1}{1+i}.$$

$$u=\frac{1}{1+\frac{1}{2}i}$$

Vm=the value of the yearly instalments of principal.
Vi=the value of the interest payments.
$Vm+Vi$=the value of the obligation.

Then

Vm is, of course, the value of an annuity of m for n years, expressed by

$$Vm = m\left(\frac{1-v^n}{i}\right) = m.a_{\overline{n}|}\,, \tag{1}$$

and

$$Vi = \frac{r}{2}.\ \frac{P\,(u+v) - m\,[u.a_{\overline{n}|} + (a_{\overline{n+1}|} - v)]}{1-v}, \tag{2}$$

expressions which, as already stated, are easily reduced, numerically, by the use of the ordinary tables.

In order to demonstrate the expression for Vi we proceed as follows:

$$Vi = \frac{r\,P}{2}u + \frac{r.P}{2}v + \frac{r\,(P-m)}{2}u.v + \frac{r\,(P-m)}{2}v^2$$

$$+ \frac{r\,(P-2m)}{2}u.v^2 + \frac{r\,(P-2m)}{2}v^3 + \ldots\ldots$$

$$+ \frac{r\,(P-[n-1]m)}{2}u.v^{n-1} + \frac{r\,(P-[n-1]m)}{2}v^n.$$

Put

$$S = P\,(u+v) + (P-m)\,(u.v+v^2) + (P-2m)\,(u.v^2+v^3)$$
$$+ \ldots\ldots + (P-[n-1]m)\,(u.v^{n-1}+v^n).$$

Then

$$vS = P\,(u.v+v^2) + (P-m)\,(u.v^2+v^3) + \ldots\ldots$$
$$+ (P-[n-2]m)\,(u.v^{n-1}+v^n) + (P-[n-1]m)\,(u.v^n+v^{n+1}),$$

and

$$(1-v)\,S = P\,(u+v) - m\,(u.v+v^2) - m\,(u.v^2+v^3) - \ldots\ldots$$
$$-m\,(u.v^{n-1}+v^n) - (P-[n-1]m)\,(u.v^n+v^{n+1}),$$

or, as $P-[n-1]m = m$,

$$S = \frac{P\,(u+v) - m\,(u.v+u.v^2+\ldots+u.v^n+v^2+v^3+\ldots+v^{n+1})}{1-v},$$

Consequently,

$$Vi = \frac{r}{2}.\ \frac{P\,(u+v) - m\,(u[v+v^2+\ldots+v^n]+v^2+v^3+\ldots\ v+^{n+1})}{1-v},$$

an expression which is identical with (2).

The foregoing expressions assume that the valuation is made on the basis of an effective rate of interest convertible annually. The usual practice in the valuation of corporate securities, however, is to assume that interest at the nominally effective rate is convertible

semi-annually, and to conform to this practice, therefore, a modification is necessary. This may be effected by developing analogous expressions in terms of u only, but a far simpler method is to take i_s, representing the nominally effective rate convertible semi-annually, such that

$$1+i_s=\left(1+\frac{i}{2}\right)^2$$

and to substitute i_s, so obtained, for i in the above formulæ.

The Province of Equity in Life Insurance.

WALTER S. NICHOLS.

WHAT is equity in respect to life insurance? On the answer to this question depends the solution of many of the problems which divide the actuarial world. Premium loadings, apportionment of expenses, the distribution of surplus, proper limitation of the cost of new business, surrender values and surrender charges, these and many other subjects which are now warmly debated will be found on a last analysis to involve this fundamental proposition—what is equity when applied to life insurance?

A hundred years ago the physicists of Europe were engaged in a battle royal over the question whether force should be measured by velocity or by its square; it was at last discovered that the dispute concerned a definition of terms. Momentum involving time was measured by the first power: work which disregards time, by the square. Until we are agreed on what constitutes equity, we can never reach an agreement on these actuarial subjects of dispute.

The meaning of equity in its application to ordinary business is well understood. To use the language of the law, it is founded *ex æquo et bono*, in natural justice, honesty and good conscience; it is the spirit of the law, which, through the imperfection of language, cannot be embodied in formal statutes. The same is true in insurance. But the ordinary business contract presupposes a direct pecuniary advantage to both contracting parties; like trade, of which it is an adjunct, it contemplates mutual gain. The only mathematical considerations which enter are those of simple gain or loss. Apart from any legal consideration the natural justice or injustice involved in such contracts is determined by simple business principles.

Insurance is the antithesis of ordinary business; it contemplates a decided gain for one of the contracting parties at the expense of the other. This is its *raison d'etre*. Mathematically it is a bet; without any insurable interest it is a mere speculation. In either case it would be immoral and illegal, lacking the first elements of equity. Morally, however, insurance is again the antithesis of the ordinary wager. One aims to distribute the losses of the many

among the fortunate few through the law of average, the other, reversing that law, seeks to concentrate the losses of the many in the hands of a fortunate few. One is conservative and the other destructive of the public weal. The equities of life insurance spring from this moral character of the contract. But a result that might be equitable in ordinary business which contemplates mutual gain, might be extremely unjust in a contract which looks to the gain of one party at the expense of the other. To determine what is equitable in life insurance the whole spirit as well as the letter of the contract must be studied. It cannot be too strongly impressed that in all branches of business the contract relations of the parties control the application of the principles of equity. Any contract freely and intelligently made by a competent party, for a valuable consideration, is binding according to its terms unless prejudicial to the public welfare. This fundamental doctrine determines the whole scope of equity to annul or modify a contract. The law cannot make a new agreement or alter the terms of one already made. It can only construe in cases of doubt, and annul what may be illegal. But when substantial injury results from the partial or total absence of valid contractual relations, the law may in equity remedy the injury so far as the contract relations of the parties allow, since the implication in every contract is that it is legal.

No decision has done more, perhaps, to affect the equitable interests of policy-holders in the funds of the company than that of the United States Supreme Court in Insurance Companies *vs.* Statham, where Mr. Justice Bradley, himself at one time an actuary, discussed the effect of war on the non-payment of premium. Had death or accident interposed to prevent payment, no matter how harsh the circumstances, there could be no remedy against forfeiture. The peculiar character of the contract rendered it legal for the parties to stipulate as they did for absolute forfeiture, regardless of misfortune: but the illegality of payment during war canceled the time element of the stipulation to pay. If it had been an ordinary business undertaking equity might have been satisfied to let the contract stand with simple waiver of payment during war; but here time was of the essence and its elimination, since it was the act of law vitiated the whole through the fault of neither. Mere annulment would not do justice because the undertaking had been partly executed by payments already made, and temporary insurance had been enjoyed. The best remedy in equity was to restore as nearly as possible the parties to their original position.

The temporary insurance already received could not be withdrawn, but if excessive payments had been made on it looking to the future, equity demanded compensation for such excess. This to my mind was the real logic of Justice Bradley's decision, and up to this point he was strong. This excess could have been estimated either by comparison with the cost of a policy for the expired term, or, as was done, by analyzing the premium actually paid; the first would have better harmonized with the entirety of the contract. But when the court went beyond this and based its decisions on *quasi* individual ownership of the reserve it seems to me it was treading on very uncertain ground. Nothing in the contract hinted at individual ownership. The company's method of computing its premiums, employed as it was simply to secure a proper average, could not give such ownership. Four justices dissented from Judge Bradley's views.

These remarks serve in a general way to indicate the province of equity in life insurance. With few exceptions this business is carried on in this country on the mutual plan. The member contracts not directly with his fellow-members, but with a corporation composed of them. His agreement is not, as is often loosely said, for insurance at its actual cost to him or the company, but at its average cost for the members as a whole, having due regard to the cost of each particular class distinguished by age and form of contract, so far as these can be determined. When the company in its published literature classifies its risks and charges according to age it makes these elements of the mutuality, and the very undertaking of insurance implies an average not a specific cost. These features and such others as may be imported determine the equities of the contract; these equities, as I have said, grow out of the contract and depend upon its character—they do not shape it. If the company undertook to insure on the basis of ten-year instead of annual periods, or according to occupations, a different class of equities would arise. Here, again, let me emphasize the fact that insurance is a business of adjusting averages, not of dealing separately with individual risks as things having a fixed and specific measurement. Insurance of individual risks, except as parts of a general average, would be pure speculation, not insurance in the accepted sense of the term. No matter how glibly we may talk of individual reserve, insurance cost and all those other features which relate to the individual policy, they are meaningless unless interpreted as functions of the controlling average principle. Not once

in a hundred times does the premium paid on the individual policy represent even approximately its actual cost, nor is it expected to. It measures simply what is the expected average cost of a hundred or a thousand similar policies. Equity in insurance cannot ignore this fundamental truth.

Proceeding in chronological order, the disposition of the first premium raises a question of equity. The procurement of the member is purchased by the corporation, perhaps at a temporary loss to itself. Is the equity of the other members invaded? It may be stated as a general principle that no mutual corporation has a right to knowingly purchase new members at a permanent loss to itself, without the members' consent. On the other hand, a corporation is a thing distinct from the members composing it; it contemplates continued existence with a continually changing membership. It does not follow that a corporation may not purchase where it will be the gainer in the end, even though some of its present members may be the losers. The question is, are the interests of the existing membership as a whole, and of the corporation as a going concern, best conserved by the purchase? The perpetuation of the corporation is an element in the original contracts of the members. In the beginning of a mutual enterprise, such excessive expenditures may be necessary to the sound establishment of the company. Beyond a doubt the corporation is obligated where practicable to adjust the equities of all its members as affected by such purchase. As the new member himself is bought in the interest of the corporation, not his own, I leave it as a query how far we should be charged with the cost of his purchase without previous agreement.

During his first five years the member belongs to a class of preferred lives, yet is charged full insurance. Equity is not violated by this so long as the special classification of such lives is not called for in order to preserve the substantial justice of the mutual scheme, is no part of the original contract, and the advantages of such selection are offset in later years as well as by the cost of new membership. It should again be borne in mind that every mutual scheme is limited by its contract conditions, into which are imported both the law and the charter. A contract for profit-sharing is both equitable and mutual though it excludes losses. But if a company should hold out, as an equitable mutual scheme, a classification by age or by any other basis, with full knowledge of the fact that such classification did substantial in-

justice to members, it would be guilty of fraud. Insurance is not against the simple happening of events but against our ignorance of their happening. Knowledge would vitiate the insurance. Knowledge by one party of substantial injustice either in premiums or classification, at the time of insuring, violates the equitable principle of mutuality.

The reserve element of the premium next challenges attention. Apart from legislation or anything in the contract, the mere fact that a company computes its liabilities by a net premium gives no equitable claim on that special item to the individual policy-holder. It may adopt a gross valuation, or any other plan that best answers its purposes. Its reserve is simply to make good apprehended deficiencies of future premiums ; it is to be joined to them in the payment of future losses. It is never expected to be, and rarely is, the sum which, accumulated against a single policy, will pay for that policy, but that which accumulated against all policies will, with their future premiums, meet the sum total of their claims. It is an aggregate sum applicable to each policy only in such amount as may be needed at the time. Its computation for individual policies is simply a means to an end, simply a method to secure the required aggregate. The employment of the net reserve to establish or develop the plant is a familiar feature of foreign insurance.

Does legislation or policy contracts, requiring a net reserve or a surrender of its partial equivalent, alter the case? We fail to see that it does. The individual reserve is still simply a measure ; the company may be liable to the member, according to its contract, for this or any other sum. But there is no special reserve fund the equitable property of policy-holders unless such fund is separately held under contract, like a savings bank's deposit. The ordinary insurance contract in its simple form is an entirety ; so much insurance for so much money, with an equitable return of over payments. It neither inquires how those premiums have been calculated, nor stipulates as to the methods which the company shall adopt. It knows nothing specifically of reserves or surrender values, unless these have been imported into it by statute or by distinct agreement of the parties.

The prominence of the net reserve element as a measure of equitable interests is largely due to the open and universal use by the companies of the net premium as the basis of calculation and its recognition by statute law. In other branches of insurance the

equities are adjusted on gross premiums without any attempt at analysis, while, as we well know, the same rule largely prevails in foreign life companies. Equity will inquire, however, into a company's familiar principles of business as well as its actual contract stipulations when necessary, and the fact that net premiums are the basis of life insurance calculations becomes an important factor in attempts to measure the policy-holders' equity. What it cost the manufacturer to produce his goods may be the best measure of their value in case of loss : it does not itself establish their value, nor is it always the best measure. Only when a net reserve is made conclusive of individual interest by express or implied contract does it become so. When through insolvency or lapse the contract fails, the reserve element may furnish a measure for adjusting the equities of the insured against the company ; but unless a part of the contract, it is not the only measure, nor theoretically the best. On the contrary, nothing but practical necessity justifies its use ; if it were practicable, either through reinsurance or agreement, to continue the contracts scaled if need be, this would be the true equitable adjustment. Our statute laws exact simply an aggregate reserve computed on the basis of individual policies, as an item of liabilities. They do not exact the separate finding of each premium contribution ; they even allow a gross valuation when such reserve liability is deficient, and the employment of capital to make good the amount. Do not misunderstand my meaning ; I am not disputing the importance of the reserve as a measure of equities, but its individual ownership, and its conclusiveness as a measure in the absence of special agreement.

With the reserve computed comes the apportionment of surplus. Our premiums have been loaded for expenses and contingencies. The express or implied contract with the members is that the portion not so required shall be returned. Equity asks on the threshold on what principle the premiums have been loaded. In ordinary business it is the familiar rule that investors share the expenses according to their investments. It would seem that this, too, should be the principle in life insurance, except as modified by its peculiar features. The payments he makes are the investments of the member, and a percentage of these is the ordinary business rule adopted ; but self-insurance is an important feature of this business. Between a ten-year endowment and a ten-year term policy is an enormous margin in the risk actually carried by the company, as compared with the investment of the insured. Unless

the care of his money is worth as much to the member, or is as expensive to the company as the actual insurance granted, an equal loading may be most inequitable. A company may grant an endowment for a single year and receive as a consideration nearly the entire face of its policy. It is plain that the ratio of premium investments as between different classes of policies, will not of itself suffice to establish an equitable rule of loading, which must cover both cost and contingencies.

But passing from this, on what principles should the surplus be determined? It may be said at the outset that in all cases where the company has discretionary power to deal with the equities of the members, the courts will not interfere with its methods or results unless it appears that this discretion has been abused and substantial injustice has been done to the contract relations. But the company is bound to adopt that method which will in its judgment secure the best practical results. Since the surplus has arisen from different sources as interest, mortality gains, and expense savings, the company is bound to consider such sources so far as practicable if the contributions of different members have been grossly unequal. The question is what would the member have paid if he had been charged at the start only with the actual cost of his insurance according to his contract, for the company has agreed to return to him the difference. Neither the law nor business common sense exacts refinements which are of questionable value in the adjustment of moneyed interests that are incapable of accurate computation, but prefers simpler business rules that appeal to the ordinary sense of justice when these will preserve the substantial rights of the parties. This is the sense in which the term equity is understood in insurance as well as other contracts. It is possible for the actuary to violate the spirit of equity as well by the sublimated refinements of a method unintelligible to any but himself, as by a method so gross as to show the error on its face.

In the absence of contract stipulations when should such divisions be made? Equity fixes two boundaries; they should not be made so often that the law of average has not time to work, nor so seldom that the members are unduly kept out of their own. The ordinary business rule of annual accountings applies to life insurance like any other, except as the average element interferes. On our inland lakes there are periods of years of storms, followed by years of calms. No inland insurance com-

pany would be justified in declaring an annual dividend unless backed by a heavy surplus. A term of years is needed for an average, and until its expiration no dividend has been fairly earned. No life company should divide until satisfied that its dividend has been earned.

This leads to another question, the retention of a more or less permanent surplus fund, the contribution of former members. The company has the first lien on any surplus for its own protection; after this is satisfied, it should be returned to the members who are entitled to receive it. This is the judgment of the courts as well as business sense. So far as practicable, it should from time to time be restored and replaced by newer contributions. A southern fire company once retained its surplus until the correct return of the overloaded accumulations to the former policy-holders, to whom the court decreed the title, would have cost more than the money to be distributed. Forfeited claims of former policy-holders present, however, a peculiar case. While the same general principles apply, the question arises whether the company may not have a lien on such for its continued protection, paramount to its ordinary liens. I will not stop to discuss it.

Closely associated with this is the retention of dividends of certain classes under tontine agreements and separate from the general surplus. It may be said first that the chartered power to insure lives and grant annuities usually includes all forms of such contracts that are not contrary to public policy, and whatever in such contracts is strictly subsidiary to the main end in view. The motives which prompt annuities and life insurance, forbearance and prompt distribution of surplus, savings bank accumulations, and insurance at current cost, are alike legitimate, depending on the varying needs of the insured under varying conditions. They may even be united in the same individual as time works changes in his circumstances. A contract that defeated its own legitimate ends, such as the granting of a life insurance coupled with an annuity which equalized and offset it, even if desired, might be of questionable legality, but the grant of an insurance to be followed by an annuity would be questioned by none. So long as the mutual equities of the members are preserved, variety of contract is a part of the contemplated scheme of life insurance.

Retention and distribution of their own surplus among a limited class of members would seem at first to conflict with the mutuality of the whole. So, perhaps, might special contracts for surrender

values and other privileges. The true bearing of these can only be determined by considering along with them the varied character of the contracts contemplated by the scheme. Can substantial justice and equity be preserved among all? Are special privileges to special classes offset by equal advantages to the rest? Is the underlying principle of mutuality vitiated, or are the limitations imposed only such as are incidental to the assumed variety of the life insurance contract, and subsidiary to a broader plane of mutuality which unites the whole? Are the best interests of the members as a whole, and of the company as a going concern, consulted in the scheme? These are the class of questions which determines whether the mutual character of the scheme has been violated by class limitation. A corporation restricted by its original charter to the mutual plan may, under an amended charter, add stock insurance without violence to the rights of its members, provided they are treated as stockholders who will reap the benefits of such stock insurance. I apprehend that a similar principle is involved in all contracts which deprive the membership as a whole of the profits shared by a special class; are the former, when regarded as a united body of stockholders, benefited by the arrangement?

I will refer only to one other class of equities—those involved in surrender values. Much has been loosely said and written about the harshness and injustice of forfeitures in life insurance. The hue and cry over this matter has been a primary cause of our legislation regarding life insurance equities, and a controlling feature, both in their office treatment and in the framing of our contracts. Legally forfeiture involves two ideas—that of a penalty or punishment and that of a necessary consequence of something done or omitted. Equity seeks to relieve against any undue severity of the former when the contract will permit. Hence, as is often said, forfeitures are odious to the law, just as cruel or unusual punishments are antagonistic to our constitution in criminal matters, so they are antagonistic to the spirit of our law in business contracts. But forfeitures merely as a legitimate part of a business scheme should not be odious. Policies involving forfeiture were legal until prohibited by statute. But experience tended to show that in contracts for the future, covering the contingencies of a lifetime, absolute forfeiture resulted in converting what was part of a business scheme into a harsh penalty imposed on misfortune. This tended to defeat the object of insurance, and so to negative the public policy which gave it sanction. Such was the true

ground, as I conceive it, for condemning the old plan of forfeiture, and does not necessarily render unjust or impolitic schemes of limited forfeitures which do not substantially affect the real object of the insurance, and may be intelligently agreed on by the parties. The proper province of legislation against forfeiture was simply to remove, if necessary, undue harshness of the contract. When it went beyond this, and attempted to vigorously define the equities of the parties, regardless of the many and varied conditions which differentiate each individual company, it seems to me it was unduly invading not only the right of the citizen to contract, but the right of the corporation to manage its own affairs in accordance with its needs. Statutory laws that by their operation virtually prohibit the organization of new companies, or the granting of endowments, themselves need reforming.

Apart from statutory requirements, or special contract, the company which stipulates simply for an equitable surrender value has first to consider and properly provide for its own protection. It is certainly entitled to be left in as good position as if the member had never joined, but can it claim to be reimbursed for the advantages it would have received from the member's continuance? This, I believe, is the general view; but a bank receiving deposits subject to check expects to hold its deposits subject to check, though a run on the bank might compel it to close. If surrender values had not been stipulated for, and were granted simply as a privilege, the propriety of reimbursement for expected advantages would be unquestioned. On the other hand, the bank can pay its last penny of obligation; the insurance company fails of its mission unless its average is maintained. I think that the damage done to its average by withdrawal is the thing that should be considered in an equitable surrender value, and in this connection an important question meets us in the health of the retirant. Should that be considered? Here the possible disturbance of average is obvious. The right of selection is unilateral; it belongs only to the insured, and involves the power of selection against the company. The mere withdrawal of sound lives through the influence of a company's bad repute might destroy the rights of the remaining members. An agreement for dividends contemplates a return of overpayments according to the original status of the members. It is in harmony with the whole scheme of average on which the business rests. An agreement for equitable surrender values should contemplate an altered status, otherwise it empowers the member to elect for his own advantage in a way

destructive to average. It would seem plain that health should be considered in so far as it is likely to damage the average, whether in granting surrenders or providing a stipulation as to how they shall be measured.

On what basis should equitable surrenders be computed? Here, again, comes in the limitations of the net reserve as a standard. The whole theory of the business and the methods on which it is conducted favor the net reserve as perhaps the best equitable standard for the measurement of a hypothetical standard risk, but with such modifications as the deviation of the risk in question may call for. The fire underwriter fixes a standard premium as the cost measure of a standard hazard, and adds to or deducts from his premium according to its departure. A policy which has run but a single year is not a standard risk and its theoretical reserve is no proper measure of its surrender value.

I have thus sought in a general way to indicate what has seemed to me the province of equity in this unique department of business. It is a question which has sorely puzzled the courts in determining the rights of lapsed policy-holders and members of insolvent companies. The influence of mistaken ideas has shown itself in our faulty legislation whenever attempts have been made to adjust by statute the equities of the policy-holders. It penetrates the official management of the company when problems whose true solutions involve the broad principles of the law of contracts are dealt with as simple questions for the insurance mathematician. The conditions which will modify the standard or determine the deviations will differ according to the company. Here comes in the hardship of statutory rules which construct procrustian beds for every company to fit.

One transcendent fact must be clear in relation to all forms of life insurance, however conducted. No scheme, whatever its principles or methods, can be equitable which in a commercial sense jeopardizes the ultimate safety of the contract. The insurance is for protection: if there is not protection, if the plan is unsound, it is unjust to all. Protection depends on the right application of sound principles of average, and practical average is a relative term. If it were possible to indefinitely increase the number of companies, the laws of average would lead us to expect that, no matter how carefully the risks were selected, some would fail through the mere deviations of their risks. But in any properly managed institution this probability is so small as not to be worth serious commercial consideration. This is what we mean by a

safe average. The greatest weakness of the assessment system, as it has ordinarily been conducted, has been that its risks have been bound to deviate from the expected average through lapses and selections against the company.

Our habits of business thought all tend to foster the idea that the province of equity in life insurance is to equalize the moneyed benefits. The idea is strengthened by the refined analysis through which we seek to subdivide our classes and compute the cost for smaller and smaller groups, and by the emphasis imposed on the investment element of the premium.

We are apt to lose sight of the underlying truth that inequality of pecuniary benefit is the essential factor of the business, that the status of the members at the start, not at a subsequent period, is the controlling feature, that the less we know the more we insure, and that every addition to our knowledge limits the scope of our business. Equalization of cost in conformity with our knowledge at the start would be all that equity required in any system of mutual insurance, if subsequent additions to our knowledge did not endanger the plan. If the entire body of policy-holders entered together, if no new members were allowed and the insurance was purchased by a single premium, future adjustments could equitably be made on the basis of the original charges. But the voluntary character of premium payments yet to be made, and the obligation to deal with all members alike, and with new members on the basis of later knowledge, compels to that extent a subsequent modification of our original plan. We do not deny the individual member his share of dividends because his life has become impaired; but if subsequent knowledge compels a change of rate, according to age for new members, equity requires that our older members should share in the reform. Could we know nothing of the effect of age, occupation or climates, and cover young and old alike at one adequate rate of premium, the fullest conception of insurance would be realized. There is a specific time appointed for every man to die; we cannot know it, and therefore we are able to say, as a fair business proposition, that to the extent of our ignorance we will pool and share our losses. But after our pool is formed our knowledge of the future begins to grow, and we are tempted in the light of our new knowledge to unduly recast our original scheme. Equity primarily asks two questions—was the agreement fair and legal when the pool was formed? Have its terms been carried out in the letter and in the spirit?

Note on Premium Loading.

WALTER C. WRIGHT.

A PROMINENT business man proposed to insure his own life for the sum of $50,000, wishing to do so by a single premium 30-year endowment insurance policy, such as is described and analyzed in the accompanying table. My information is, that notwithstanding the unquestioned excellence of the risk, this application went begging, being made successively to several offices. Whether it was finally taken by any company or not I do not know. But while it is reasonable to suppose that this sort of contracts might not be in much demand with applicants, especially if not offered with duly liberal rights to the recovery of a cash surrender value for any year of the policy term, why companies should refuse to write them, when voluntarily requested by acceptable risks, is not apparent to me.

In the first half of the table I have used the rate of premium and figures of a Massachusetts company to which, I understand, the proposal was made, and perhaps accepted; and in the other half an equally liberal premium, determined according to what I consider a scientific method of allowance or provision for meeting the incident death risks, expenses and computed reserves. The company in question is a wholly mutual one, and the figures are to be studied as applicable to a participating policy. It may be noted that the scientific premium is $1,270.15 less than the other premium, and thus a more attractive offer, and yet by due reserve and accumulation at interest of what the successive annual death risks do not indicate as proper to use for current expense, or return as surplus, it produces in all an allowance for expense of $3,381.60, or $196.45 more than the single initial expense margin provided by the company in the other case. Also that if the latter is not all spent at the issue of the policy, the unexpended portion must either be accumulated in some independent way, and appropriated to defray future expenses, or treated as surplus and returned as such the first year, leaving the net reserve and death cost transactions to be conducted ever afterward with no other expense provision than the actual interest earnings in excess of 4 per cent. may yield.

And, further, that when operating on the first or unscientific plan, if the cash surrender values are endorsed on the policy in accordance with the commendable practice of the Massachusetts companies, we find a premium of $22,295 yielding a surrender value of only $19,364.65 at the end of a year in one case, while a premium of $21,024.85 would yield a value of $21,258.30 in the other. In other words, without a great return of surplus to account for the fact, the figures would reveal a perfectly exorbitant charge for insurance in the first case, supposing that owing to the death of the beneficiary, or some other good reason, only one year's insurance might actually be required under the policy; while in the other case the charge so displayed would be quite consistent with that under an annual premium policy of the same amount, according to the risk carried. In fact, this anomalous appearance would not be extinguished in the first case for a number of years following issue. It may be finally observed that the premium of $21,024.85 cannot be shown to be a very low one, because the applicant might readily invest that sum for himself, purchasing annual premium insurance from the company in question with its income, and thus secure $50,000 for his estate in case of his death or survival, about as fully and conveniently as by the policy.

What is mathematically correct may not always be commercially desirable, but I do not suppose that mathematical correctness with adequate allowances can ever destroy commercial desirability.

The mode of loading used in producing the premium called "scientific" in this illustration is that explained in my paper read to the Society October, 1890. See Vol. I., page 147.

DATA, VALUES, ETC., OF THE POLICY APPLIED FOR AS DESCRIBED IN THE PRECEDING REMARKS.
AGE AT ISSUE, 28. SINGLE PREMIUM ENDOWMENT INSURANCE, $50,000. TERM, 30 YEARS.

COMPANY'S PREMIUM, . $22,295.00
NET PREMIUM, . . 19,109.85
COMPANY'S SINGLE EXPENSE MARGIN, 3,185.15

SCIENTIFIC PREMIUM, . . . $21,024.85
NET PREMIUM, ... 19,109.85
INCREASE BY PROVISION FOR EXPENSE, . 1,915 00

Year.	Initial Reserve.	Death Cost.	Terminal Reserve.	Surrender Charge.	Initial Reserve.	Insurance Expense.	Death Cost.	Terminal Reserve.	Surrender Charge.	Age.
....	....	....	....	....	....	....	....	....	$242.00	....
1	$19,109.85	$247.10	$19,627.15	$262.50	$21,024.85	$139.30	$232 15	$21,494.50	236.20	28
2	19,627.15	247.05	20,165.20	255.50	21,494.50	139.10	231.80	21,983.40	230.15	29
3	20,165.20	246.65	20,725.15	248.00	21,983.40	139.05	231.70	22,492.00	223.85	30
4	20,725.15	246.15	21,308.00	240.00	22,492.00	138.85	231.45	23,021.40	217.25	31
5	21,308.00	245.65	21,914.70	232 00	23,021.40	138.70	231.15	23,572.40	210.40	32
6	21,914.70	244.75	22,546.55	224.00	23.572.40	138.40	230.65	24,146.25	203.25	33
7	22,546.55	243.85	23,204.55	215.00	24,146.25	137.75	229.60	24,744.75	195.85	34
8	23,204.55	242.35	23,890.40	206.50	24,744.75	137.25	228.70	25,368.60	188.20	35
9	23,890.40	240.90	24,605.10	197.00	25,368.60	136.50	227.50	26.019.35	180.25	36
10	24,605.10	238.95	25,350.25	188.00	26,019.35	135.35	225.65	26,699.10	172.10	37
11	25,350.25	236.35	26,127.90	178.00	26,699.10	134.30	223.85	27,408.90	163.65	38
12	26,127.90	233.55	26,939.45	168.50	27,408.90	132.80	221.35	28,151.10	155.00	39
13	26,939 45	230.20	27,786.85	158.00	28,151.10	131.00	218.35	28,927.80	146.15	40
14	27 786.85	226.25	28,672.05	148.00	28,927.80	129.00	215.00	29,740.90	137.15	41
15	28,672.05	222.30	29,596.65	137.50	29.740.90	126.80	211.35	30,592.40	127.95	42
16	29,596 65	218.75	30 561.75	127.00	30,592.40	124 95	208 30	31.482.85	118.55	43
17	30,561.75	216.05	31,568.15	116.50	31,482.85	123.45	205 75	32,412.95	108.85	44
18	31,568.15	212.45	32 618.45	105.50	32,412.95	121.75	202 90	33,384.80	98.90	45
19	32,618.45	208 35	33,714.85	94.00	33.384.80	120.15	200.25	34,399 80	88.65	46
20	33,714 85	204.70	34,858.70	82.50	34,399.80	117.90	196.45	35 461.45	78.20	47
21	34,858.70	198.90	36,054.15	71.00	35.461.45	114.85	191.45	36,573.60	67.55	48
22	36,054.15	191.00	37,305.25	59.50	36,573.60	110.80	184.70	37,741.05	56.85	49
23	37,305.25	181.45	38,615.75	48.00	37,741.05	105.50	170.80	38,969.40	46.25	50
24	38,615.75	168.65	39,991.70	37.00	38,969.40	98.70	164.50	40,265.00	41.20	51
25	39,991.70	153.90	41,437.45	26.50	40,265.00	90.05	150.10	41,635.45	26.05	52
26	41.437.45	134 45	42,960.50	17.50	41 635.45	79.15	131.95	43.089.75	17.05	53
27	42,960.50	110.30	44,568.60	9.50	43,089.75	65.35	108.90	44,639.10	9.35	54
28	44.568.60	80.70	46,270.60	3 50	44,639.10	48.15	80.25	46,296.25	3.40	55
29	46,270.60	44.55	48,076.90	.00	46,296.25	26.70	44.50	48,076.90	.00	56
30	48,076.90	.00	50,000.00	....	48,076.90	.00	.00	50 000.00	....	57
Totals	$920,172.60	$5,916.25	....	....	$949,816.05	$3,381.60	$5 636.05	....	....	...

Problem of the Value of Money.

Chapter 30 of "Éléments d'économie politique pure ou théorie de la richesse sociale; par

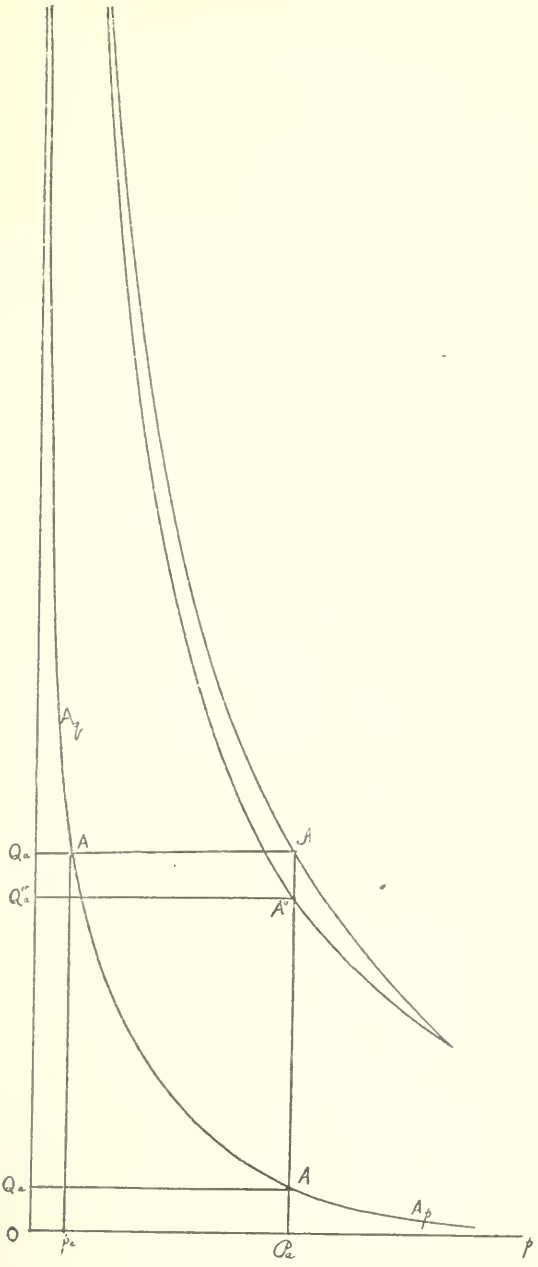
LÉON WALRAS,

Professeur d'Économie politique à l'Académie de Lausanne. 1874."

TRANSLATION BY RUFUS W. WEEKS.

THE two precious metals, gold and silver, have, on account of certain very special qualities, been chosen, or rather have imposed themselves, as the standard of value and the medium of exchange of the wealth of the community. As to this, a discussion has long been carried on on the question whether the precious metals have a real value in themselves or whether on the contrary they have only a value of pure convention. This dispute has continued under one form or another down to our own day. Among people in general there is a widespread prejudice, to the effect that money is only a representative symbol; we could even cite curious examples of this error in the writings of persons above the ordinary, who are, however, unacquainted with political economy. Among the economists there are those who claim that the precious metals have no value except that which they have, on account of their use in making utensils and ornaments, and that their use as money adds nothing to this primitive value. There are others who maintain that gold and silver have only the value which comes from their being made into money, and that if they had not that value they would have none. This question has never been perfectly cleared up, in fact it cannot be except by mathematical reasoning. I shall now enter on this process of reasoning and shall solve the question by this method if it admits of solution thereby. This is the question of the value of money.

I take up this question before treating of the qualities of the precious metals, because it does not apply solely to gold and silver, but also to every commodity which is capable of serving as a medium of exchange. Undoubtedly the precious metals have, as we shall soon see, the monetary qualities to a higher degree than any other commodity, but they do not possess them in a way absolutely exclusive. I have already cited wine as fulfilling,


A_q
Q_a
A
$\bar{A}$
Q''_a
A''
Q_a
A
A_p
0
p_a
Q_a
p

within certain limits, the conditions of money. I could also cite, as being in the same category, tobacco, which is said to have served as money in certain southern States during the American war of secession. Let us take then a certain commodity (A) and then let us inquire what influence upon its value as a commodity its adoption as the medium of exchange would have.

Here at the outset we discover the error of the common prejudice above referred to. It is only something which is a commodity properly speaking which can be adopted as a medium of exchange—in other words, money should be one of the species of social wealth. The attempt would be vain to employ as money a thing which did not have in itself any value of exchange. Suppose laws and decrees intervene and succeed in giving momentary legal and enforced circulation to flints, for example: it is clear that at the first moment of trouble the authorities would become powerless and the holders of this money would be ruined. But it is precisely in such circumstances that money ought to have, and that the precious metals do have, more value than all the other commodities. It is, therefore, an essential condition—a condition which we may add to those which we have enumerated, and which we may even write down as the first of all—that money should be a commodity forming in itself part of the social wealth, having an intrinsic value of exchange. Subject to these restrictions let (A) be our commodity; let $A_q\ A_p$ be the curve of price of this commodity, expressed in another commodity (B); let Q_a be the existing quantity of (A) and p_a the price of (A) expressed in commodity (B).

We choose, then, this commodity (A) to serve as a medium of exchange. Whatever certain economists may say of it, to the original use of (A) a second use is added and the existing quantity divides itself between the two uses. Only a part of the quantity Q_a (call it Q'_a) remains devoted to the primitive use; the other part (call it Q''_a) becomes devoted to use as money. Thus in fact the quantity of (A) which was Q_a will be reduced to Q'_a, so far as regards the primitive use; but the quantity being reduced, it is not possible but that the price will rise; it will rise from p_a to P_a.* It is here that the problem of the value of money comes into clear view; it consists in the following: Q_a and p_a being known, as

* NOTE BY THE TRANSLATOR.—This symbol here appears for the first time, and its meaning is defined by this sentence.

determined by the curve $A_q\ A_p$, or its equation, (1) $Q=F(p)$, to determine Q'_a, Q''_a and P_a.

Let Q_b, Q_c, Q_d . . . . be the existing quantities of other commodities (B) (C) (D) in circulation in the market. Let α' be the coefficient of circulation of the portion of (A) remaining as commodity, and α'' the coefficient of circulation of the portion become money. Let β, γ, δ . . . . be the coefficients of circulation of (B) (C) (D). By a coefficient of circulation I mean the number by which we must multiply the existing quantity of any commodity to obtain the total quantity of that commodity being exchanged—that is to say, being bought and sold—during a certain determined period of time, a year, a month, a day. For example: If there exists a million bushels of wheat on the market, and if, within a specified time, there have been sold, purchased at wholesale, resold, repurchased at retail, five million bushels of wheat, the coefficient of circulation is 5. This coefficient is, of course, the higher the more frequently the commodity enters into exchange. It may be less than unity; it may be nil.

Granting the above, we have further to observe:

1st. That the new value of the commodity (A) (call it V_a) is necessarily the same for the part devoted to the primitive use and for the part devoted to the use of money. Otherwise the substance would be transformed, as the case might be, either from commodity into money or from money into commodity. Suppose, for example, that (A) is silver, of which a part remains in the form of various ornaments, while a part has been put into use in the form of coin. If it is the case at a given moment that silver is worth more in the form of coin than in the form of ornaments, ornaments will be melted down to make coin. If, on the other hand, it is the case that silver is worth more in the form of ornaments than in the form of coin, coins will be melted down to make ornaments. These are matters of daily occurrence.

2d. That the value of the total quantity of money entering into exchange is equal to the value of the total quantity of all the other commodities entering into exchange. The value of the money which has purchased the commodities is equal to the value of the commodities which have been sold for the money.

By virtue of the two reasons above stated we obtain a real equation of exchange, of the form

$$(2)\quad \alpha'' Q_a V_a = \alpha' Q'_a V_a + \beta Q_b v_b + \gamma Q_c v_c + \delta Q_d v_d + \ldots\ldots$$

Transferring to the first term of the equation, the first member of

the second term; then dividing by α''; then dividing by v_b; we have

$$(3)\quad \left(Q_a - \frac{\alpha'}{\alpha''}Q'_a\right)P_a = \frac{\beta}{\alpha''}Q_b + \frac{\gamma}{\alpha''}Q_c p_c + \frac{\delta}{\alpha''}Q_d p_d + \ldots\ldots$$

All the terms of the second member of the equation, when put in this shape, may be supposed constant from our present point of view. Let H be the sum of these terms; then we have

(4) $\left(Q''_a - \frac{\alpha'}{\alpha''}Q_a\right)P_a = H$. Dividing by P_a, transferring $\frac{\alpha'}{\alpha''}Q_a$ from the first member to the second, and replacing Q'_a by its value, $F(P_a)$ derived from the equation $Q = F(p)$, we have

$$(5)\quad Q''_a = \frac{H}{P_a} + \frac{\alpha'}{\alpha''}F(P_a).$$

This last equation, which is that of the curve of price of the commodity (A) considered as money, a curve passing through point (A'') is approximately hyperbolic, for the reason that α' which is the coefficient of circulation of (A) commodity, is very small in comparison with α'' which is the coefficient of circulation of (A) money; and the term $\frac{\alpha'}{\alpha''}F(P_a)$ very small in comparison with the term $\frac{H}{P_a}$; that is to say, that the price or the value of money varies approximately in inverse ratio to its quantity. There is, therefore, a great basis of truth in the observation made by Hume in his "Essay on Money," that if, some fine morning, everyone in England should find a certain sum of money in his purse in excess of what had been there the night before, the result of such an occurrence would be purely and simply a universal increase in prices, corresponding to a diminution in the value of money; and that if, on the contrary, everyone should find less money in his purse by a certain amount than had been there the night before, the result would be an increase in the value of money, manifesting itself by a universal fall in prices. This observation is subject to only one criticism. Hume ought not to have assumed the addition or subtraction of the same amount of money in every purse, but the multiplication of the sums in all the purses by a common factor, or their division by a common divisor. Under these conditions only it will be true, at least approximately, that

the result of the occurrence will be a rise or fall in prices proportionate to the decrease or increase in the quantity of money.

Adding together the equations (1) $Q'_a = F(P_a)$ which is that of the curve of price of (A) commodity, and (5) $Q''_a = \frac{H}{P_a} + \frac{\alpha'}{\alpha''} F(P_a)$, which is that of the curve of price of (A) money, we obtain the equation (6) $Q_a = \frac{H}{P_a} + \frac{\alpha'' + \alpha'}{\alpha''} F(P_a)$ which is that of the curve of price of (A), considered at the same time as a commodity and as money. This curve can be graphically constructed by the compounding of the two curves $A_q A_p$ and A'', by the addition of the ordinates corresponding to a common abscissa; the resulting curve will be the curve of price passing through point A. The curve in question, or its equation, allows us to obtain P_a when Q_a is known. We may then obtain Q'_a and Q''_a by means of the two constituent curves, or by means of their equations. We have thus reached the solution of the problem of the value of money as we formulated it.

NOTES BY THE TRANSLATOR:

Having been requested by the Council to prepare some comments on the essay by Prof. Walras, which was translated by Mr. St. John and presented at the annual meeting of the Society, April 29th, 1897 (Vol. V., p. 61), I have examined that essay with care, endeavoring to follow Prof. Walras' reasoning throughout. When dealing with the case of monometallism, he points out that in the problem involved there are in that case three unknown quantities and three equations from which the unknown quantities may be ascertained. When I undertook to construct equations I found it difficult to be sure of the Professor's precise meaning, and therefore went to some of his other writings in the hope of finding more definite statements of his views. I found that the passage which he himself refers to in the essay, namely, the thirtieth lesson of his "Elements of Pure Political Economy," supplied what was lacking, and on reading it over it seemed to me that the translation of that passage would be the best contribution which I could make to the discussion, showing, as it does, precisely how Prof. Walras proposes to construct the equations which were suggested in outline in the essay.

In following the sequence of Prof. Walras' equations, I found that I could obtain a better comprehension of his reasoning by

treating his equation (4) in a different manner from that in which he has treated it. The equation is

$$(4) \quad \left(Q''_a - \frac{\alpha'}{\alpha''} Q'_a\right) P_a = H.$$

Transposing the first factor of the first member of the equation we have

$$(7) \quad P_a = \frac{H}{Q''_a - \frac{\alpha'}{\alpha''} Q'_a}$$

The meaning of this equation may be stated in words as follows: In a region where the only money or means of paying for commodities is a currency of one metal, say gold, the value of a unit of gold money is equal to the following: That average fractional portion of the entire values of all commodities except gold, which changes hands during the space of time in which all the money changes hands once on the average; divided by the number of units of gold money in existence less the number of such units which were used to buy the *commodity* gold during the specified space of time.

Now, it is evident that the amount of money which is used to buy the commodity gold during the space of time that all the money in existence is once spent for all kinds of commodities taken together, must be very small relatively to the aggregate of all other kinds of commodities purchased; hence the minus quantity in the denominator of the fraction above may for practical purposes be ignored—the equation then becoming a statement of the quantitative theory of money applied to a monometallic currency.

The dictum with which Prof. Walras begins his discussion, namely, that money can be only some commodity which has an intrinsic value, is no necessary part of his argument; in fact, all that his argument requires is that it should be true in some cases that money is a commodity having an intrinsic value. The experience of mankind has effectively negatived the view that this must always be the case, as pointed out, among other authorities, by John Stuart Mill in his "Political Economy," Book III., Chapter XII., sec. 7. For the purposes of the "Equation of Exchange," there can be no doubt that whatever currency is used in ultimate payment for goods is money, and in countries like Russia, Austria

and Italy it is irredeemable paper which performs this function, hence for such a country the equation expressing the price or value of the unit of money becomes simply

$$(8) \quad P_a = \frac{H}{Q''_a}$$

where the value of money would vary inversely as its volume.

Cost of Insurance.

MR. M. W. TORREY.

IN his interesting and instructive paper on the "Cost of Insurance," Mr. Craig, Vol. V., p. 31, speaks of "the beautiful harmony in results secured by different methods of computation and combination in the Mathematics of Life Insurance." The object of this article is to show, 1st, That if Mr. Craig had carried out his theory to its logical end, the final net results under his scheme, so far as the company is concerned, would agree exactly with the results obtained by the use of the cost of insurance tables in general use, and also with the insurance value tables. 2d, That if any company calculations regarding the mortality gain or loss, as compared with the tabular, are based on Mr. Craig's theory regarding the Cost of Insurance, the results obtained will be incorrect. 3d, That the reserve on the policy does modify the cost of insurance.

I agree with Mr. Craig that, looking at the matter from one point of view, the reserve of deceased members can be considered as belonging to the survivors, thus making of the reserve a Pure Endowment, which will necessitate, as he advocates, the figuring of the "Cost of Insurance" upon the gross amount at risk. The considering of the reserve as a Pure Endowment will necessitate the preparing of new tables showing the tabular accretions to the reserve of the surviving policy-holders from the reserve of those that die. Such a table, for want of a better name, I will call Pure Endowment Accretions. These Pure Endowment Accretions form what might be called the mathematical complement of Mr. Craig's theory, which is the logical end of the same.

If the "Cost of Insurance" and a company's resultant mortality gain or loss are figured on the gross amount at risk, there must also be figured the total tabular Pure Endowment Accretions required to maintain the reserve, and this total must be compared with the total reserve released by death, to see whether there has been a gain or loss. It is evident that if the death losses have been less than the tabular amount there will be a saving in the Cost of Insurance, figured by Mr. Craig's method, and it is also evident that as

the death losses have been less than the tabular amount there must be a deficiency in the amount of the Pure Endowment Accretions, as the reserves released by death have been less than the tabular amount. This deficiency on account of the Pure Endowment Accretions must be made up, so as to maintain the reserve, and as the deficiency was caused by the favorable mortality, it is proper and right to deduct it from the mortality gain. If this be done it will give a net gain exactly the same as though the mortality gain had been figured out in the usual way.

The following illustration and tables will demonstrate my point:

Suppose that a company had, at the beginning of the 5th policy year, only the amount and kind of insurance stated in Table A, all of which was issued at age 40. On the left hand side of the column giving kind and amount of insurance, I have stated the Cost of Insurance figured in the usual way (column A), and on the right hand side I have given the advance Cost of Insurance on the full amount at risk (column 2). I have also worked out the tabular Pure Endowment Accretions, see column 6.

During the 5th policy year there have been death losses as stated in Table B, column 1, leaving the amounts of insurance in force as given in column 2. The amount of the tabular Pure Endowment Accretion per $1,000, I have stated in column 3. The total Pure Endowment Accretions required to maintain the reserve are given in column 4.

TABLE A.

ACTUARIES' 4%.

COLUMN A.		COLUMN 1.	COLUMN 2.	COLUMN 3.	COLUMN 4.	COLUMN 5.	COLUMN 6.	COLUMN 7.
Cost of Insurance.	Kind and Amount in force at beginning of 5th year.	Initial Reserve.	Natural Premium.	Column 1 Minus Column 2.	Interest.	Sum of Columns 3 and 4.	Tabular Pure Endowment Accretions.	Sum of Columns 5 and 6. Terminal Reserve end of 5 years.
$1,079.87	Life, ... $100,000	$8,422.20	$1,124.70	$7,297.50	$291.90	$7,589.40	$89.83	$7,679.23
918.49	10 Payment Life, . . 100,000	21,523.10	1,124.70	20,408.40	816.34	21,224.74	251.21	21,475.96
656.35	10 Year Endowment, 100,000	42,830.10	1,124.70	41,705.40	1,668.22	43,373.62	513.36	43,886.98
967.07	20 Year Endowment, 100,000	17,586.20	1,124.70	16,461.50	658.46	17,119.96	202.63	17,322.59
808.28	10 P. E. 20, ... 100,000	30,490.00	1,124.70	29,365.30	1,174.61	30,539.91	361.46	30,901.37
1,036.89	20 Payment Life, . . 100,000	11,913.90	1,124.70	10,789.20	431.57	11,220.77	132.81	11,353.58
1,162.33	10 Year Term, . . . 100,000	1,723.20	1,124.70	598.50	23.94	622.44	7.36	629.80
$6,629.28			$7,872.90					
			4 % Interest, 314.92					
	Craig's Cost of Insurance at end of year, $8,187.82							

Table B.

Actuaries' 4%.

Kind and Amount in force at beginning of 5th year.	Column 1. Death Losses.	Column 2. Amount in force at end of year.	Column 3. Tabular Pure Endowment Accretions per $1,000.	Column 4. Total Pure Endowment Accretions required to maintain reserve.
Life, ... $100,000	$1,000	$99,000	.8983	$88.93
10 Payment Life, . 100,000	.....	100,000	2.5121	251.21
10 Year End'ment, 100,000	2,000	98,000	5.1336	503.09
20 Year End'ment, 100,000	.....	100,000	2.0263	202.63
10 P. E. 20, . . 100,000	.....	100,000	3.6146	361.46
20 Payment Life, . 100,000	1,000	99,000	1.3281	131.48
10 Year Term, . 100,000	1,000	99,000	.0736	7.29
Totals, . . $700,000	$5,000	$695,000		$1,546.09

Expected Death Losses (Mr. Craig's Method).

(Sum of column 2, Table A, with 4 per cent. interest added to bring the amount down to end of year).. $8,187.82

Actual Death Losses.

Ordinary Life	$1,000.00	
10 Year Endowment	2,000.00	
20 Payment Life	1,000.00	
10 Year Term	1,000.00	
Total Death Loss		5,000.00
Mortality Gain according to Mr. Craig's Method		$3,187.82

Tabular Pure Endowment Accretions Required to Maintain the Reserve.

(Sum of column 4, Table B) $1,546.09

Actual Pure Endowment Accretions.

(Reserve, as per column 5, Table A, released by death.)

$1,000—Ordinary Life	$75.89	
2,000—10 Year Endowment	867.47	
1,000—20 Payment Life	112.21	
1,000—10 Year Term	6.22	
Actual Accretions		1,061.79
Pure Endowment Loss		$484.30
Mortality Gain	$3,187.82	
Pure Endowment Loss	484.30	
Net gain	$2,703.52	

MORTALITY GAIN FIGURED IN USUAL WAY.

Expected Cost of Insurance. (Sum of column A, Table A)		$6,629.28
Death Losses	$5,000.00	
Reserve on same	1,074.35	
Net Death Loss		3,925.64
Net Gain		$2,703.64

This agrees with the net result obtained by the first method. The difference of a few cents is due to the fact that the reserve and Cost of Insurance tables used were not carried out to a sufficient number of decimal places.

If I understand Mr. Craig's position correctly he would consider the gain on account of favorable mortality as $3,187.82, which is clearly wrong, as no account would be taken of the Pure Endowment deficiency, although that deficiency is a *real tangible quantity which cannot be overlooked.*

That the reserve on a policy does modify the Cost of Insurance, basing the Cost of Insurance on the gross amount at risk, as advocated by Mr. Craig, can be easily proven as follows :—Let us suppose that the entire $5,000 of death losses had occurred among the 10 Year Term policies. There would, therefore, be in force at the end of the year the amounts of insurance stated in Table C, column 2. The total Pure Endowment Accretions required to maintain the reserve are given in column 4.

TABLE C

ACTUARIES' 4%.

Kind and Amount in force at beginning of 5th year.	COLUMN 1. Death Losses.	COLUMN 2. Amount in force at end of year.	COLUMN 3. Tabular Pure Endowment Accretions per $1,000.	COLUMN 4. Total Pure Endowment Accretions required to maintain reserve.
Life, ... $100,000	.....	$100,000	.8983	$89.83
10 Payment Life, . 100,000	.....	100,000	2.5121	251.21
10 Year End'ment, 100,000	.....	100,000	5.1336	513.36
20 Year End'ment, 100,000	.....	100,000	2.0263	202.63
10 P. E. 20, . . 100,000	.....	100,000	3.6146	361.46
20 Payment Life, . 100,000	.....	100,000	1.3281	132.81
10 Year Term, . 100,000	$5,000	95,000	.0736	6.99
Totals, . . $700,000	$5,000	$695,000		$1,558.29

Expected Death Loss (Mr. Craig's method).....		$8,187.82
Actual Death Losses.....		5,000.00
Mortality Gain.....		$3,187.82
Tabular Pure Endowment Accretion required to maintain the reserve (sum of column 4, Table C).....		$1,558.29
Actual Pure Endowment Accretions (reserve as per column 5, Table A, released by death).		
$5,000 Ten Year Term.....		31.12
Pure Endowment Loss.....		$1,527.17
Mortality Gain.....	$3,187.82	
Pure Endowment Loss....	1,527.17	
Net Gain.....	$1,660.65	

This is considerably less than the net gain in the first example, though the gross amount of death losses ($5,000) is exactly the same.

Now for a word regarding Insurance Values. On the first page of Mr. Craig's article he states that it is his conviction that "the present value of the future yearly normal Cost of Insurance is the net single premium for the sum insured in the event of death occurring within the unexpired term named in the contract." Looking at the matter from his point of view I will acknowledge that this statement is correct so far as it goes, but it does not go far enough. He should have added—from which present value must be deducted the present value of the future normal yearly Pure Endowment Accretions.

The insured is liable to the company for the present value of the Cost of Insurance, figured on the gross amount of the policy and the company is liable to the insured for the present value of the Pure Endowment Accretions. The difference between the two will give Elizur Wright's Insurance Value.

Following is a table illustrating a 10 Year Endowment for $1,000 issued at age 40, worked out for the entire 10 years on the theory of considering the reserve as a Pure Endowment.

TABLE D.

ACTUARIES' 4%.

Year.	COLUMN 1. Initial Reserve.	COLUMN 2. Natural Premium for $1,000 Insurance.	COLUMN 3. Column 1 Minus Column 2.	COLUMN 4. Interest Earned.	COLUMN 5. Sum of Columns 3 and 4.	COLUMN 6. Tabular Pure Endowment Accretions.	COLUMN 7. Sum of Columns 5 and 6 Terminal Reserve at end of 5 yrs.
1	$85.759	$9.963	$75.796	$3.032	$78.828	$ .825	$79.653
2	165.420	10.204	155.216	6.209	161.425	1.731	163.156
3	248.919	10.476	238.443	9.538	247.981	2.731	250.712
4	336.475	10.818	325.657	13.026	338.683	3.854	342.537
5	428.301	11.247	417.054	16.682	433.736	5.134	438.870
6	524.632	11.742	512.890	20.516	533.406	6.594	540.000
7	625.763	12.345	613.418	24.537	637.955	8.297	646.252
8	732.005	12.996	719.009	28.760	747.769	10.245	758.014
9	843.778	13.711	830.067	33.203	863.270	12.488	875.758
10	961.538	14.481	947.057	37.882	984.939	15.061	1,000.000

Mr. Craig's Insurance Value of the above contract, at the beginning of the first year (Single Premium for 10 Year Term Insurance), is..... $93.295

Present Value of the Pure Endowment Accretions. (Present Value of column 6, Table D.)..... 46.837

Difference..... $46.458

Which difference agrees exactly with the Insurance Value figured in the usual way. (See page 32 of Wright's Savings Bank Life Insurance.)

In conclusion, I would say that the whole matter, as it appears to me, can be summed up as follows:—The reserve on a policy can be used to help pay the claim in case the policy becomes a death loss, and the Cost of Insurance and the Company's Mortality gain or loss can be figured on the net amount at risk in the usual way; or the reserve can be considered as a Pure Endowment and the Company's Mortality gain or loss figured on the gross amount at risk, in which case the Pure Endowment gain or loss must also be figured out and the result combined with the Mortality gain or loss, to obtain the net gain or loss on account of Mortality. The net results obtained by either method are identical.

Johan de Witt.

(1625-1672.)

Translation by

ERNST WILLEM SCOTT.

EVERYBODY who has even superficially studied our country's history is acquainted with the life of the famous pensionary of Holland and West Friesland. Only a few particulars about his youth are known. Probably he was born at Dordrecht in 1625; the year as well as the date of his birth is somewhat uncertain however. His father was Dr. Jacob de Witt, barrister, a wealthy man who held important offices; his mother was Anna van den Cornput and was a kinswoman to the well-known defendant of Steenwyk. Johan studied at the gymnasium of Dordrecht of which institution Dr. Beekman, a friend of Descartes, was the rector, consequently he began his mathematical studies under excellent guidance. In 1641 Johan became a student at Leiden and studied law under a professor of the name of Schoten who is less famous than his contemporary and colleague, Franciscus van Schooten, professor of mathematics, who probably inspired de Witt's love for this science. After having studied during four years he set off on a journey in foreign countries (a custom of that time), which lasted more than twenty months and was made a Doctor of Laws. In the autumn of 1647 de Witt took the oath as a lawyer before the courts of Holland and next year he established himself in the Hague. In this time he often occupied himself with mathematical studies, he corresponded with Van Schooten Junior, who had succeeded his father as a professor of mathematics, about this science, and it seems that he also consulted Descartes now and then. The two essays which we are acquainted with: "Principles of the Doctrine of Curves," and "On Geometrical Places in Planes and in Space," were not published earlier than in 1658 and 1659.

In 1650 Johan's father was imprisoned at Loevesteyn by Willem II., who however released him after three weeks, Johan having done everything possible to attain that end. Willem II. died soon afterwards, Jacob de Witt was re-established in his office and Johan was appointed Pensionary of Dordrecht. From this time Johan de Witt's history is closely connected with that of our country; it is the most famous period of our history.

Of the seven United Provinces Holland was in all respects the most important one. The provincial towns appointed deputies for the "States," and at the same time a pensionary who advised and assisted the deputies and who led their occupations. It is in this way that JOHAN DE WITT, in his dignity of pensionary of Dordrecht, became a member of the States' Assembly of Holland and West Friesland. Each town in Holland had a pensionary and each province had a provincial pensionary, who formerly was called "Landsadvocaat," afterwards "Raad Pensionaris" (Grand Pensionary), and to this dignity JOHAN DE WITT was called in 1653 after having held this office temporarily during the illness of Adriaan Pauw. By his influence and talents he not only rendered himself indispensable but governed the whole country. During twenty-two years he was the head of the State, animated by only one passion indicating the direction of his whole life, the ambition to render his country mighty and strong among the European nations and to maintain its liberty against every foe, whether a foreign prince menaced it or a descendant of the Stadholders endangered the rights of the states and municipalities which the Grand Pensionary was obliged to protect against every one. One of these descendants of the Stadholders, Willem III., however, appeared to be a match for him. Already in 1668 DE WITT no longer reigned by his might but only by his talents; by these he exercised a strong influence, wherever he came, and it was this that made his enemies fear him. In 1672 he asked and obtained his dismissal as Grand Pensionary and shortly afterwards he was, together with his brother Cornelis, most cruelly murdered by the mob of the Hague; his remains were buried in the New Church in that town.

JOHAN DE WITT had rare and extensive talents and a noble character. He never deceived anybody, was frank, plain, and true even in diplomacy. Sir William Temple declared that nobody was superior to him in diplomacy. In history and law he was very learned; he studied with success the mathematical sciences; navigation was familiar to him as well as strategy. All departments of government—foreign affairs, commerce, defence, finance —were managed by him. Seamen, regents, merchants, diplomats, all praised his character and his administration.

He applied his knowledge of mathematics especially to the finances of the State. A debt of 140,000,000 of guilders, at 5 per cent, burdened the States of Holland in 1648 and, if this debt had not continually increased by new wars, Holland would have been rid of it in 1690 by DE WITT'S measures.

To his efforts to improve the finances of the State we owe the work that contains the first model of a mortality table which, although inferior to the present ones, is the first application of the principles of the science of probabilities on the idea of chance of life; it is entitled *Waardije van Lijf-renten naar proportie van Losrenten*, and was printed in 1671 in the Hague by Jacobus Scheltus. Montuala believed this book lost, Jacobus Bernouilli (1704) could not obtain a copy of it, and Leibnitz, who thought he possessed one, could not find it and tried in vain to obtain another one (1705). All this becomes clear when we consider that only a few copies were given to the States of Holland. Prof. D. Bierens di Haan, at Leiden, discovered a copy belonging to Mr. J. F. L. Coenen von's Gravesloot, Bart.

On the occasion of the Centennial Jubilee of the Mathematical Society: "An indefatigable labour surmounts everything," in 1879, this Company issued (by Joh. Enschedé, publishers and stationers at Haarlem) a facsimile of this copy; in consequence, DE WITT's work has come into the hands of many people.

It is not generally known that a second original copy of the work is in possession of the Algemeene Maatschappij van Levensverzekering en Lijfrente, and it is interesting to know that in the State archives at the Hague we found a very choicely written copy which, as we believe, was written by Johannes Hudde. This is remarkable because the printed work contains a declaration of Hudde concerning the exactness of DE WITT's method. We read on the cover: "Demonstratie van den Ed. Heere JOH. DE WITT over de Waardije van Lijfrente in proportie van Losrente,"[1] and in the heading: "Calculatie van Lijfrenten, geinsereero in de resolutiën v. d. Staten van Holland op 30 Juli, 1671, pg. 116." ("Calculation of Life Annuities inserted in the Resolutions of the States of Holland on the 30th July, 1671, page 116.") Is this, perhaps, the copy that was presented in the conference in which it was treated?

The book begins with some theses and proofs concerning mathematical expectations which are afterwards applied to the duration of human life. DE WITT supposes that everybody's chance of life in each half-year between ages 4 and 54 years is the same; he equalizes it to unity. The same chance for persons between 54 and 64 is supposed to be $\frac{2}{3}$; for persons between 64 and 74 years, $\frac{1}{2}$; and for persons between 74 and 81 years,

[1] Demonstration of His Honour, Joh. de Witt, concerning the valuation of life annuities in proportion to the ordinary interest.

⅓ ; older people are not taken into account. Further he calculates the cash value @ 4% of an annuity of 1,000,000 pence, which is paid once, twice, three times .....to 153 times, every time after a half-year, and divides the total amount of these values by the sum of the chances. The conclusion is, that the value of a yearly annuity of f. 1 on the life of a young person is f. 16. De Witt does not explain the way in which he obtained these chances of life but he says in a supplement that an investigation after the decease of thousands of people, the data having been obtained from the "Blaffaerden"[1] of the States, proved that the value of the said annuity valued was a little more—there he mentions f. 18. The great value of this work is due, in the first place, to the choice, logical and complete treatment, which gives us a very high idea of de Witt's mathematical knowledge, and further, to the explanation of the exact signification of an annuity, which gave reason for the composition of the first model of a mortality table, and finally caused the elaboration of the matter.

We called Johan de Witt the founder of the science of life insurance in Holland, and nobody will object to it, because many well-known authors have acknowledged de Witt's merits in this respect.

W. Kersseboom often lays stress on the fact that the words of the Grand Pensionary distinctly imply the methods of his calculations. Nicolaas Struyck gives a more scientific form to the rules of de Witt, and builds upon the basis which the latter laid. He adds: "What an immense work two bookkeepers of the States of Holland have had—to make the calculation after the thesis of the Grand Pensionary! In order to obtain a tolerably exact result they had to begin with large numbers, and consequently incurred difficult multiplications and very large additions." Prof. Beaujon says: "A Johan de Witt, whose broad shoulders bore a great part of the weight of European politics, still found time in the last years of his life, which were in no way a period of rest, to state a formula for the 'calculation of the valuation of life annuities in proportion to the ordinary interest.'" And Prof. J. C. Naber declares: "The Republic without Stadholders obtained no higher praise than for the finances of State. * * Immortal praise was again obtained by the States' guide, Johan de Witt. In spite of his being overwhelmed with business, he still found time to take an active part in the new direction, which the mathematical

[1] Registers.

sciences took in his days by the influence of Huygens and Descartes, a direction which reached its end in Leibnitz and Newton."

But also in foreign countries DE WITT is considered the founder of the actuarial science. W. I. Thomson writes: "Dr. Halley can be considered the discoverer and scientifical arranger of what are termed mortality tables but there is no doubt of DE WITT's being some years in advance in the explanation of a method by which the exact value of a life annuity can be obtained. Halley was more scientific than DE WITT, but there is no reason for placing one of them higher than the other. Both made important discoveries and contributed a great deal to enlarge our knowledge, and undoubtedly both are to be considered the founders of the application of the science of probabilities of life and death to practical purposes."

We should not fail to quote the well-known work of James Geddes: "History of the Administration of JOHN DE WITT, Grand Pensionary of Holland," the Hague, 1879. Although Geddes places himself on a partial point of view and does not occupy himself with the work in which we take so great an interest, his declaration is important: "DE WITT was highly elevated beyond his contemporaries; he excels by head and shoulders nearly all celebrated men of his time."

Finally we mention Cornelius Walford, who, in his "Insurance Guide and Hand-book" (2d edition, 1867), writes about DE WITT in the following terms:

"He sought for and investigated all the available data of that "period, and brought his own experience and great power of mind "to bear upon the subject, by which means he solved problems "and laid down general principles which hold good to the present "day. His report and treatise on the terms of life annuities was "the first known production of the kind, and the lapse of two "centuries has not lessened its importance in the eyes of learned "and competent authorities." Here Walford refers to the "Assur- "ance Magazine," Vol. II., "where the entire treatise of DE WITT "has been (thanks to the ingenuity and perseverance of Mr. Hen- "driks) reproduced after lying hid for nearly two centuries."

Abstract of the Discussion of Papers Read at Previous Meetings.

WHAT CONSTITUTES AN INSURABLE INTEREST ON LIVES. CLAYTON C. HALL. Page 9, Vol. V.

Mr. Macaulay: Under the head of an assurable interest several subjects are usually discussed which are in reality entirely separate, and it will, I think, help to clear our judgment if we divide the question into its several departments.

The first point to be considered is: What interest must a person have in the life of another to justify his taking out a policy on that other life? Mr. Hall has clearly supplied the answer to this question. A policy may be taken out by any relative who is in any way financially dependent upon the life assured, or by any creditor or other person who would lose financially by the termination of that life. In England and in Canada these conclusions are based upon the Gambling Act of George III., passed in 1774. In the United States the same conclusions have been reached, but they are based merely upon the decisions of the courts as to what is consistent with, and what is opposed to, public policy.

But now we come to a second question, which is often confounded with the first, but which is, in my judgment, entirely separate, namely: If a person voluntarily takes out a policy on his own life, paying the premiums thereon himself, is there any restriction or limitation on his power to nominate as the beneficiary under that policy any person or institution he may select for that purpose? Or, to put the question differently, is there any statute or reason of public policy to prevent a man from making a financial provision for any person in whom he may be interested, by making that person the beneficiary under a policy on his own life? As I have said, in my judgment this is an entirely different problem from that of assurable interest. The question of assurable interest deals only with the power of a beneficiary or third party to take out a policy on the life of the person to be assured. This second division of the subject deals with the powers of the life assured himself to nominate a beneficiary.

I will illustrate the point at issue by a case which came before

my own notice not long ago in Canada. A person proposed to take out a policy on his own life, and to make it payable (as a donation) to a certain Young Men's Christian Association, he paying the premiums himself. He asked whether it could be done. We told him, "Certainly we will issue the policy."

I do not think that such an assurance as that is in any way opposed to public policy. Neither do I think it is opposed to either the letter or the spirit of the Gambling Act. It is not an assurance taken on one life by another, but an assurance taken out by the life himself at his own initiative, and made payable to a third person at his own desire. The Gambling Act merely provides that persons shall not be at liberty to speculate upon the lives of others. Such a restriction is quite right and proper. But in the case supposed there is no speculation. The policy is taken out by the life himself, at his own wish, he himself paying the premiums, and merely names as beneficiary another person or institution in which he is interested. I fail to see that the Gambling Act or the question of assurable interest has any bearing on such a policy. I, of course, wish it to be understood that I do not refer to any case which may be in reality a speculative assurance by a third party parading in a false garb, but to those genuine instances where the man himself takes out the assurance, and himself pays the premiums, the beneficiary having nothing to do with the matter.

And here I may point out that there is a very interesting difference between the manner in which the Gambling Act of George III. is interpreted in England and in Canada. That Act is part of the law of Canada in exactly the same manner as it is part of the law in England, and yet in England it is in practice interpreted in one way and in Canada in another. In England it is interpreted with the greatest strictness, and while the companies there issue policies in favor of heirs, or legal representatives, or of the wife and children under the Wives' and Children's Policies Act, or of persons who have a direct financial interest, such as creditors, they practically draw the line there and issue policies to no others. They interpret the Act very narrowly, and consider that they are legally prohibited from issuing a policy payable, for example, to a man's aged father or to his widowed mother or sister.

In Canada, on the contrary, the Act is interpreted in the same broad manner that the question of the assurable interest has been dealt with in the United States. A person who is in any way financially interested in the continuance of the life of another is

considered to have an assurable interest. Policies in favor of parents, sisters and younger brothers are freely issued. As a matter of curiosity I have classified the beneficiaries under 1,000 policies issued in the Dominion by a Canadian company with the following results:

Heirs, executors, etc.,		450
Wife,	277	
Wife and children,	10	
Children,	17	
Adopted son,	1	305
Intended wife,		5
Father,	40	
Mother,	120	
Father and mother,	5	
Father and brother,	1	166
Brother or brothers,	15	
Sister or sisters,	29	
Brothers and sisters,	3	47
Husband,		2
Niece,		1
Uncle,		2
Friend,		1
Creditor,		21
Total,		1,000

But there is still another point to consider, namely, to whom and to what extent may a policy which has once been legally put in force be afterwards assigned? The answer to this question really hinges upon the prior question, whether or not a life assurance policy is a contract of indemnity. If it is once admitted that a life policy is not a mere contract of indemnity, and that in this respect it differs from a contract of fire insurance or marine insurance, and that the owner of the policy has an absolute title to it and a valid right to receive the whole of the assurance money, then there is no reason why he should not be allowed to transfer his ownership to another person. A policy of life assurance is in practically the same position as a debenture payable some years hence, and it should, I think, be treated in exactly the same way, so long as nothing criminal is done which could endanger the life of the person assured. Neither the legislature nor the courts are

justified in interfering with rights acquired in connection with such a contract, except for the very gravest reasons.

But there are other facts which I think we should understand in connection with these matters. If the Gambling Act be invoked in Canada or in Great Britain to invalidate a policy its effect is merely to relieve the company from all liability. The heirs or the estate of the life assured do not acquire any title to the proceeds of the policy. This is a point which we ought to remember very clearly. It is not a question of merely saying that a certain beneficiary shall not be entitled to the sum assured, thus transferring the policy over to the estate of the life assured himself, but it is a question of canceling the policy altogether and merely relieving the company from all obligation to pay anybody. It has been held by the courts that if a policy is declared void it is void entirely, and that no person has any right to it.

In the next place it is very important to note that the company issuing the policy is the only party that has a right to object to the policy. I presume that in Canada the Crown and in the United States the State would have the same right, but that right is purely theoretical, since it can hardly be conceived that the Crown would step in and prohibit a company from paying the amount assured by a policy, if it desired to do so. The practical effect therefore is that the company, and the company alone, has the right to take advantage of a lack of assurable interest. Furthermore, if a company issues a policy with the full knowledge of the facts, and therefore cannot plead ignorance, I doubt very much indeed if the courts would uphold it in afterwards endeavoring to repudiate its liability under that policy. This point is important because if a company chooses to issue a policy with its eyes open, it is probable that no one thereafter can object to the validity of such a policy on the ground of lack of assurable interest.

I may also mention that a case came under our own notice in Canada, where the court took a different view of the rights of a divorced wife from that of the American judges in the case of Insurance Co. *vs.* Schaefer, which is quoted on page 19 in Mr. Hall's paper, where the rule was applied that "a life policy originally valid does not cease to be so by the cessation of the assured party's interest in the life assured." That identical point came up in an unreported case in Canada, the company having paid the money into court. It was decided that although the policy was made payable by its terms to the wife by name, it was in reality

payable to her in her capacity as wife of the life assured, and that as she had ceased to be his wife she was no longer entitled to it; and it went to his estate.

The President: That is very interesting, indeed. We have had a great many disputes on this point in the United States, but it has never been brought to a conclusion before that I know of.

Mr. Lee: Did that go to a court of last resort?

Mr. Macaulay: It only went to the lower court as the wife did not appeal from the judge's decision. The court took the position that the husband had paid the premiums, that it was a provision made by him for this woman as his wife, and that although it was her name that was mentioned, it was in her relation as his wife, and that her interest in the policy ceased as soon as she was divorced.

Mr. Whiting: If you ask the question, what the law ought to be on that subject, the question is extremely simple, and is answered by the question, who paid the premium? If the premium be paid by the insured he should have the right to assign the policy or nominate his beneficiary, whoever it might be. It lies in precisely the same position as where a man leaves by will a certain sum to various legatees. There is no more danger of his misdirecting the funds, and we may leave it practically to his discretion, perhaps with the power to withdraw the beneficiary. He should have, I think, that right where the matter is one of gift. Now when it comes to a question of the premium paid by another, the matter is changed. There another person is apparently seeking an interest in this life, and the rule of insurable interest cannot be too strictly applied in cases of that kind. So we get the two positions of the thing clearly defined.

Now in relation to this other branch of the case, which has greatly puzzled the courts and sometimes is ruled one way and sometimes another—that if the policy at its incipiency has an insurable interest, shall it continue to be a valid policy notwithstanding the insurable interest has disappeared? This is likewise answered in the same way: Who pays the premium? If the premium is paid by the insured, the right clearly remains; but if the premium is paid by the beneficiary and his insurable interest should disappear, it seems to me that the right to retrieve under that policy should absolutely disappear with it, for the same reason that he should not be allowed in the first place to secure the insurance without possessing such an interest—except the right to

recover on the premiums paid up to the time that the policy has ceased. I think that the true relation of this insurable interest matter has not been brought upon the courts. The courts have relied upon the intelligence of the attorneys who appeared before them and a mere simmering down of those various views which were presented. And if the attorneys of the several companies should get together and have some real understanding in relation to a prosecution, not only of this question but of a number of others of similar character which very greatly affect the companies, I think they might readily bring about some straight line of clear consideration of these matters, which would be acceptable and would in a short time prevail.

The President: I think that the suggestions made by Mr. Whiting add considerable light to what has been said before, and it certainly is true that we cannot receive the decisions of our courts hitherto made as conclusive in settlement of many of these vexed questions. Many of the decisions have been made without much intelligent thought, and show merely the reflection of the minds of the opposing counsel. I would like to ask for a little more information from Mr. Macaulay in regard to the Canadian cases he speaks of. There are two cases in which I can understand the question coming up in regard to the insurer's wife, and it strikes me that the courts might easily draw a distinction between the two. In the first case I will suppose that the policy is what we call an old style wife policy, where under the statute the wife has, in form at least, made a contract with the company, has agreed to pay the premiums, and the company has agreed to pay the insurance to the wife. We have of late years more or less abandoned that form of policy, and it has become now very common, indeed, that when a man wants to take out a policy for the benefit of his wife he will take it directly. He will be the contracting party. He will make the application; he, on the face of the policy, will be the one who agrees to pay the premiums. He simply nominates so and so, his wife, as the beneficiary. Now I can understand that a court might decide that, in the latter case, where the contract was made with the insured, where the wife had nothing, on the face of the papers, to do with it, her interest would cease with her divorce; and that the same court might decide otherwise in the case of a policy where the wife was the contracting party, and where, according to the face of the papers, she was the one who paid the premium. And I would like to ask whether, in these Canadian cases, the wife made the contract or the insured made the contract?

Mr. Macaulay: The husband, the insured, made the contract, and the wife appears simply as beneficiary. I ought also to mention that another matter which no doubt weighed with the court was that the fault of the matter was clearly the wife's in connection with the divorce, and the judge apparently felt inclined to the position that when the wife left her husband she deliberately threw up all claims upon the husband.

Mr. Nichols: I would like to say that it does not seem to me quite so clear as it does to Mr. Whiting, perhaps, that his simple line of distinction would separate in all cases. I can imagine a case which frequently occurs, of a creditor who insures the life of his debtor, and, perhaps through some other agency for which he is not responsible, the debt is canceled, or virtually canceled, and the policy is in a form in which it would not be advantageous for him to abandon it. It would be most inequitable if the man were compelled to abandon that policy through lack of insurable interest, as has been sometimes intimated by the courts.

So far as my memory serves me, Mr. Hall's statement of facts as to the decisions quoted is correct, and the general conclusions which he draws regarding the law of insurable interest are, in the main, similar to my own, and are well and comprehensively expressed. Judge Bradley was undoubtedly wrong when he asserted that the common law, prior to the revolution of 1688, forbade wager insurance contracts. All insurance on lives had been forbidden a hundred years earlier in Amsterdam, and, even prior to that date, was held to be illegal as against good morals in France, though sanctioned by other nations according to an old French maritime work, *Le Guidon*. But a term contract for life insurance executed by individual underwriters at the Royal Exchange in 1583, whose language shows that such contracts were common, was the subject of litigation as to the time of expiration. It was heard even at that early date before a court specially constituted to try insurance cases. The wager element of insurance had not attracted legal attention in England prior to the revolution, but wager contracts generally were treated as valid in common law, unless immoral or hurtful of public interests.

I note, however, that Mr. Hall has confined his citations almost exclusively to English or our eastern courts, located for the most part in sections largely devoted to commerce. A reference to decisions in the agricultural sections of the country, west and south, would show that a more rigid view there prevails regarding

the interest necessary to support a policy. In Indiana, Kansas, Wisconsin, Texas, North Carolina, Missouri and other States are to be found a class of decisions which look sharply at the pecuniary interest of the claimant. In North Carolina a church was not allowed to insure a member on whom it depended for support; in Texas a creditor has been closely restricted to his indebtedness; in Indiana, assignments to parties not supported by an already existing interest have been declared absolutely illegal. It will be observed that we have here a class of States largely devoted to agricultural pursuits, where the commercial feature of life insurance as a chose in action would naturally be regarded with less force than in States whose commercial activity gives this element emphasis. In commercial England we have the broadest doctrine sanctioning the public sales of such contracts regardless of the interest of the purchaser. In New York and one or two of the New England States we find similar broad views regarding assignments. In New Jersey it is even laid down as the doctrine of the State that until overruled by the decision of a higher court pure wager policies must be considered legal, while our Supreme Court at Washington has taken a liberal but somewhat more conservative view regarding insurable interest.

So that while I regard the general summary of Mr. Hall as a correct statement of what may be considered the soundest views of the law, it should be qualified by the fact, that the creditor is not, in all States, allowed to recover the amount of his insurance regardless of existing indebtedness, nor the assignee allowed in all to recover regardless of other interest. Notwithstanding the numerous decisions, the views of our courts have as yet but partially crystallized about any comprehensive statements of the law.

I think the paper of Mr. Hall might have been profitably extended into the domain of jurisprudence by investigating the principles underlying this doctrine.

The principle of the wager enters into most of the ordinary transactions of business life. It might be said that every dealer who buys speculates on the probability of a profitable sale; but when this is merely incidental to his legitimate work as a distributor of wealth, it cuts no figure. When it becomes the dominant factor, then we talk of his transactions as speculative or wagering. There is no hard and fast line between the two. We have all shades in the business world, from the man whose profits

are a simple compensation for his useful labor as part of our social machinery, to the speculator whose sole aim is to profit at the expense of the public good. One glides by insensible shadings into the other. As Mr. Hall says, the wager was not originally illegal at common law, nor is it yet simply as a wager apart from its effects. The deed which I get for an apparently worthless tract of land for the consideration of a dollar in the confident expectation of its speedy use is as binding as if I had paid a million, even though I knew, and the vendor did not, that it contained a Klondike gold mine, unless I misled him in making the sale. It may be fairly said that every intelligent exchange of valuable considerations by competent parties is legal unless it is contrary to public policy, that is too injurious to public interests to be allowed. At bottom public policy is the real ground for determining when any form of speculation enters the domain of forbidden wager contracts, whether they concern insurance or wheat. The question is not simply whether the contract is injurious to public interest, but whether the latter demands its prohibition. Mad speculation in gold was one of the greatest crimes and curses of our late civil war, and grain corners to-day are a direct stab at public interests ; but to prevent either by law would do more harm than good by interfering with the freedom of trade.

What the courts have aimed at, perhaps unconsciously to themselves, is to apply this modified doctrine to insurable interest in the cases cited by Mr. Hall. They have sought to find out, not simply whether the contract was opposed to public good but whether public policy required its prohibition. They have started out with the broad proposition that in the absence of any particular interest in the life of another of a pecuniary character insurance, because it fosters the gambling spirit and tempts to criminal desires and practices, should be forbidden in the public interest. The thing which has confused them has been how to determine the measure of pecuniary interest which will justify a policy. If life insurance itself was not an admitted public good the line would not be drawn where it is, but the courts simply seek to forbid that which is harmful without unduly impairing the benefits to the public. Take the cases cited by Mr. Hall : the nephew is not entitled to insure his aunt, simply by virtue of his relationship, nor an adult son his father, why? Because mere blood relationship is not of itself a pecuniary interest or a sufficient protection against gambling and crime. But the courts sustain a policy even

in the absence of kinship when it appears that the relations of affection and dependence are such that the party procuring the insurance might feel that the death of the insured was, in a commercial sense, a loss which is not outweighed by the moneyed gain from the policy. A betrothed has been recognized as a proper beneficiary. The U. S. Supreme Court, unmindful of some of its more vigorous restrictions, has been able to see in the close kinship of brother and sister a good ground for seeking to sustain the contract. Infantile insurance presents a striking case in point. So long as the benefit is reasonably confined to the idea of a burial fund, the spirit of the law supports these insurances as a valuable feature of our industrial society, but if it should go beyond this it might become a speculation suggestive of the most unnatural crimes.

It may be thought a serious blot on the soundness of our legal system that such want of harmony prevails in the decisions of our courts, but there is another side to this matter of such interest that, though somewhat apart from the main discussion, I wish to refer to it. Those of you who have ever made the law a study, know that our statutory enactments embrace but a small portion of what is known as the law, that outside of these is a great body of jurisprudence which only partly finds expression in decisions and legal treatises. This is that spirit of the law which, in varied forms, underlies the legal system of all civilized countries. With us it takes shape as the common law. It is his ability to grasp and apply this subtle spirit of the law which distinguishes the jurist. Its principles are incapable of complete expression in language. Like the spring we may seize and apply such portions as we need, but the fountain is inexhaustible. The beauty of this unwritten law is its flexibility and adaptation; the weakness of the written code is its want of flexibility and adaptation. It has been said that no two cases are precisely alike, but the printed code makes no distinctions where it applies. Its thou shalt and shall not cover everything within its range; it is the creation of legislative fiats. The common law, on the contrary, has been built up as the physical investigator builds up the laws of his science by examining and comparing the results of individual cases in the courts and inductively finding the true principles which control them. Like every department of physical science its conclusions are only tentatively held ready to be remoulded by additional light. This is the glory of our common law system; it is not

machine-made, but, like civilization itself, a growth founded on experience. In this system the true province of statutory enactments is confined to supplementing the deficiencies and in correcting, as changing conditions may demand, the doctrines of the common laws. Redundant legislation is the curse of our political system. This process of construction is going on in the common law of life insurance. The irreconcilable decisions in this particular department of insurable interest are the incomplete steps by which we may expect in time a far wiser and more perfect doctrine to be reached than would be possible through any mere acts of legislation.

A wager contract when opposed to public policy is illegal at common law. That is enough ; let the courts do the rest in applying this doctrine, even though a generation be needed to reach a settled conclusion.

Mr. McClintock : The question of insurable interest has received divergent interpretations in the courts of the United States in such a way that there are now existing two bodies of doctrine exactly opposed to each other, and I do not think that this fact has been sufficiently brought out in this discussion. The Court of Appeals of the State of New York holds one doctrine. The Supreme Court of the United States holds another doctrine. Each of these courts is supreme in its own jurisdiction. The majority of the State courts have of late years followed the Supreme Court of the United States, though some have followed the Court of Appeals of the State of New York. And the exact point of divergence is this, that in the State of New York an assignment once made is absolute. It is exactly the same as in England. The policy becomes the absolute property of the assignee. A policy may be bought and sold. Under the decision of the Supreme Court of the United States, in the case of Warnock *v.* Davis, which has been followed in various cases elsewhere, a policy of insurance can only be assigned for value or to a person holding an insurable interest, and when that insurable interest ceases or is reduced the policy money will go, so far as it can go equitably, to the assignee ; the remainder may be claimed from the assignee by the representative of the insured. We have in this country, as I think, made a step towards a higher plane of civilization in this respect. The decision of the Supreme Court seems to me as great a step in advance in one way as the Gambling Act in England was in another. It has prevented the sale of policies outright. It has given the value of the policy, so

far as the assignee is unable to show an insurable interest, to the family of the insured, where it belongs.

As regards the issue of policies to persons who can show an insurable interest, that question is really unimportant. When a person wants to get a policy on the life of somebody in whom he has an insurable interest, he gets the other man to take out the policy and assign it to him, and in that way the Gambling Act has been nullified, excepting in so far as to prevent insurances without the consent of the insured. As some of us who are old enough can remember, a great wave of a special kind of insurance gambling swept over parts of this country some twenty-five years ago. In those cases the parties themselves took out the insurances and assigned them to friends, and very soon after that the parties died and the friends got the money. There got to be regular clubs formed in certain parts of Pennsylvania and elsewhere, of people who would make arrangements with doctors and with insurance agents to scour the country for sick and dying persons. They didn't insure these people in regular companies, but they insured them in assessment companies, and they started assessment companies on purpose to carry out this kind of insurance, and it was an actual game, each one trying to overreach the other to find and insure people who were going to die sooner than the other persons' candidate would die. They called it graveyard insurance; there was a great deal of it done, and it excited the attention of the judges and legislatures, not to say of the insurance agents and actuaries and other officers. So that anything that looks like graveyard insurance is much disliked by people who are old enough to remember that time, and I am sorry to say that Mr. Macaulay's suggestion that people ought to be allowed to sell their policies to anybody they like is open to that objection. These old people in Pennsylvania did that very thing. Their policies were taken in their name. They signed the request. They were paid five dollars for doing it. They were glad enough to get the five dollars; if they thought they were going to die pretty soon it didn't matter to them whether the other person got any money by it or not. They knew he wasn't going to kill them, so those policies were issued to the insured in the name of the insured and immediately assigned to the other person. It seems to me impossible to draw the line as regards the assignment of policies in any other way advantageous to the community than that drawn by the Supreme Court. And if we are going to

exert our influence on judges or anybody else, I think that is the direction in which it would be well to direct our efforts.

Mr. Fackler: Mr. McClintock's reference to these clubs reminds me of the United Brethren Mutual Aid Association of Bethlehem, Pa., which we all remember, which was long the banner of the assessment societies, and considered by them as a proof that an assessment society can live forever, because it existed for ten or fifteen years with apparent success. That was kept alive in its last days, the last four or five years, solely by means of those clubs. It would have expired some five years earlier if it had not been for that.

Mr. Macaulay: Mr. Chairman, I have listened with a great deal of interest to Mr. McClintock's remarks, but I would like to point out that even in England policies which are taken out by persons on their own lives and assigned immediately thereafter to others, those who are the assignees paying the premiums, have been held, I believe, to be policies taken out by the assignees and not by the assured, even though the assured went through the form of signing the application. I believe this is the principle acted upon by the courts over there. So that that kind of assurance is prohibited by the law there just as much as here. I think where that fact can be shown, where it is quite clear that in reality only the form of the law has been gone through, and that the premiums were paid by the assignees, then the courts held that that is a violation of the Gambling Act, and that the policies are really taken out by the assignees, even though the application is signed by the assured. So that in reality I think that Mr. McClintock's objection don't apply.

On the other hand, if the doctrine of the Supreme Court of the United States were carried out in every case, it is quite conceivable that cases of great hardship in another direction would arise. For example, suppose that a man in business fails, and it is found that one of the chief assets of his estate is a policy of $25,000, which has been in force for, perhaps, twenty-five years—one of these old policies, like many that I have seen myself, of many of the old English companies, giving no surrender-value or paid-up policy or other consideration whatever under its terms. Now, if the creditors have not the right to sell that policy they would have to keep it in force and pay the premiums. A man might live twenty years longer, and the estate would be kept open for that length of time. Is there any objection to their accepting the offer of some other

person who would say, "I will give five thousand dollars, cash down, for that policy, and buy it out, and take my chance of whether that old gentleman will die in a long time or a short time"? The creditors, in other words, make a sale of the policy to another party in the same way as they could realize upon his real estate and other assets. Is there any reason why they should be prohibited from making such a sale as that? I, myself, don't see that there is any reason. The only objection which could be raised, that I can see, is that there might be an incentive to murder that man. But that is too far distant to really have much of importance attached to it, I think. It may be replied that a sale of that policy can be made only with the restriction that the person who buys it can't collect at any time more than he pays for the policy and the premiums, with the advances and the interest. But if the man who buys the policy takes the chance of the life living to be old, surely he ought to be given also the benefit of the chance of a live man dying young. There was a case bearing on this very point, which came under my own notice not long ago. An old gentlemen, a French-Canadian, owed money to one of our directors. The director could not get security out of him, and a long time ago he fixed things up with him as best he could, and got him to take out a $4,000 policy in favor of this director, which was a great deal less than the amount of his claim, and he said that if he would pay those premiums that he would discharge him altogether. The man paid the premiums for perhaps three years or four years—I am not sure of the time—then he paid no more. To prevent the policy from lapsing, the assignee himself had to pay the premium for sixteen or eighteen years. The policy was without profits, and the man was over sixty years old when he took out the policy, and he wouldn't die. The result was the man had to pay about $6,500 to get a $4,000 policy. In a case like that, is there any reason why a person who takes a chance like that of long living should not also take the chance of gaining by short living? My own idea is that a policy should be treated in exactly the same way as any other asset of the estate, and should be sold to the person who will give the best price for it, and realized on, and the estate closed up without further delay, and that the person who gets that should be the absolute owner.

The President: I would simply make the suggestion that it strikes my mind that both the views that Mr. McClintock and Mr. Macaulay express have weight and might possibly be practi-

cally brought into effect by a simple compromise, if it were possible to have the ruling of our United States Supreme Court hold good as the substantial law of the land, with one proviso, that in all cases of insolvency, in cases which came under the purview of the court, that the courts might order an absolute sale and thus give absolute title. I cannot see any reasonable objection to that, and it might meet most of the difficulties that Mr. Macaulay suggests.

Mr. Macaulay: I do not think any objection has been found. The objections are only theoretical and supposititious, as it seems to me.

Mr. Wells: The illustration given by Mr. Macaulay, that the man dies insolvent and that the creditors should take the life insurance policy, overlooks the view taken by the Supreme Court of the United States that the assignee has in the policy an interest equal to the amount of the indebtedness due from the insured. Mr. Macaulay quotes an illustration of the case of one of their own directors who had a claim against a certain man. Now, so far as that is concerned, it was a poor speculation, that is all. We had a case similar to that. The man had to pay six or seven thousand dollars, and he only got four thousand back. He took it as a speculation, and he got the wrong end of the speculation. That is a thing I think that we should correct. I do not believe in speculation anyway, and I certainly do not believe in speculation that involves human life.

There is one other matter in connection with what Mr. Macaulay said. I am not a lawyer, and these questions have come to my notice only in late years and not often. I understood from Mr. Macaulay that if a policy was taken out for the benefit of a person, or had been assigned to a person who had no insurable interest, it became forfeited; and if the policy had been taken out in favor of one who had an insurable interest and the insurable interest disappeared, the policy became absolutely void. Now, under our law I don't think that is the case. It is certainly not the case as regards assignments. Suppose the beneficiary murders the insured. If I am right the policy doesn't become void. It is still payable, but it is payable to the estate of the insured or to his representatives.

Mr. Macaulay: In England and in Canada a policy could only be objected to at its commencement, and not afterwards. If it is objected to on the ground of lack of insurable interest, it is void

absolutely, and no one gets any interest whatever—the estate or anybody else.

Mr. Wells: Couldn't they sue for an accounting in that case?

Mr. Macaulay: If a policy be issued validly and the beneficiary murders the insured, the beneficiary cannot benefit by his own act—that was settled in connection with that policy on the life of Mr. Maybrick. Mrs. Maybrick was held to have murdered her husband. The English courts decided that while the policy was valid, taken out by the man himself, yet that she could not profit by her own act; but the policy was valid and was payable to Mr. Maybrick's estate.

MEECH'S LIFE TABLE. HOWELL W. ST. JOHN.

Page 25, Vol. V.

F. Sanderson: The experience of the Thirty American Offices as deduced by Meech has enlisted the interest not only of actuaries on this continent but also in Great Britain. This interest is in a great measure due to the adoption of the "final series" method, by which the "existing" are projected into their probable ultimate terminations. The novelty of this method appears to have created in some minds a doubt as to the reliability of the Meech Table as a basis for premiums and reserves. Mr. St. John says that the final series plan "has proved successful." As additional evidence of this statement the following table is submitted, in which a comparison is made between the reserves brought out by Meech's Table and those derived from the Mortality Experience of the Canada Life Assurance Company for the forty-six years, 1847–1893. The striking results of this comparison become all the more noticeable when it is remembered that the Thirty American Offices' Table is based on "amounts," while the Canada Life is based on "lives"; that the former is, as Mr. St. John says, a heterogeneous experience, while the latter is essentially a homogeneous experience, and further, that the former experience was developed on the "calendar year" method and the latter by the "policy year" method. The table is based on the whole experience in each case and interest at 4 per cent.

Net Premiums and Reserves, 4 per cent.

ACCORDING TO THE MORTALITY EXPERIENCE OF THE THIRTY AMERICAN OFFICES (MEECH) AND THE CANADA LIFE EXPERIENCE.

The upper figures opposite each age refer to the Thirty American Offices' Experience and the lower figures to the Canada Life Experience.

Age.	Net Premium. (Whole Life.)	RESERVES AT END OF YEAR.			
		1	5	10	15
25	$13.67	$7.23	$38.91	$85.21	$139.51
	11.61	7.24	38.96	85.20	139.40
35	18.52	11.14	59.36	127.82	205.11
	16.27	11.13	59.25	127.54	204.72
45	26.88	16.94	88.61	186.10	290.09
	24.27	16.90	88.46	185.96	290.21
55	41.82	25.03	127.77	259.19	388.76
	38.60	25.06	128.07	260.12	390.64

Age.	Net Premium. (Whole Life.)	RESERVES AT END OF YEAR.			
		20	25	30	40
25	$13.67	$202.14	$272.84	$350.62	$518.93
	11.61	201.88	272.49	350.30	519.30
35	18.52	290.14	380.83	474.12	652.61
	16.27	289.79	380.74	474.53	654.49
45	26.88	397.05	502.51	601.70	766.72
	24.27	397.71	503.96	603.98	768.13
55	41.82	510.63	619.68	713.38	
	38.60	513.51	623.04	715.16	

Under the above-mentioned circumstances the closeness of the reserves at each age and corresponding duration is a rather remarkable coincidence, and its interest is increased by the fact that each experience is derived from assured lives on the American continent.

As indicated by the table, the net premiums of the Canada Life Experience are materially lower than those of the Thirty American

Companies' Experience; but, as is well known, two tables of mortality may produce identical reserves, but widely different premium rates.

Mr. St. John: Conforming to the well-established custom in our Society—that each contributor engage in the discussion of his own essay—I desire to state that the compilations relating to Meech's Mortality Table presented in No. 17 of our "Papers and Transactions," were not prepared for publication, but for my personal information; they were printed at the suggestion of the editor—Secretary Pierson—for the reason, I believe, that they pertain to a large mass of the mortuary experience of American insured lives, to which but little consideration has apparently been given by the members of our Association.

Few who have read Mr. McClintock's admirable essay, "On the Effects of Selection," will fail to remember his assertion that "the evidence before us is, I think, sufficient to convince the most cautious critic that the Healthy English Life Table (males) is a fair and adequate representation of American assured life after the first five years of insurance. The coincidence is indeed uniform, convincing and conclusive."

An inspection of the tables of actual and expected mortality presented in the contribution now under discussion will serve as an aid in forming an opinion to what extent Meech's Table may claim similar characteristics.

An excellent test of the effective similarity between these two tables may be found in a comparison of the premiums (single and annual) and net values for whole-life insurance, derived from each.

At three per cent interest these premiums differ on the average to an immaterial extent only; the net values also in general differ but little in the earlier years of insurance, those of the Meech Table are slightly higher and augment somewhat more rapidly as the duration increases.

One other remark may be pertinent here. Mr. Meech employed the Gompertz-Makeham formula in the graduation of his table, and has published in his book ("System and Tables of Life Insurance") serviceable auxiliary tables for facilitating the computations relating to joint lives.

COST OF INSURANCE. JAMES M. CRAIG.

PAGE 31, VOL. V.

MR. W. C. WRIGHT: I think the crucial test of Mr. Craig's views may be taken to lie in the discussion of the following paragraph: "It is my belief that there is a cost for insurance in the last year of an endowment insurance policy, and that it is on the full amount named in the contract, and that there is a sufficient sum in the hands of the company to pay the amount as a death-claim, if it become such, without encroaching on the endowment reserve." If I were to discuss the question on the supposition that the "continuous" method of computing life contingency values were to be employed, I would frame my language somewhat differently; but I shall address it with reference to the employment of the ordinary method, which assumes death to occur only at the end of each year, and policy years and interest periods to coincide. Having taken one position or the other, it would not be admissible for me to alter my ground in the course of my argument, and I shall assume that Mr. Craig has meant to be as scrupulous, and did not have the "continuous" method in mind when he wrote this paragraph. It then follows that at death, maturity, or the end of the year in the given case, the sum "in the hands of the company," irrespective of other policies, is, by assumption, exactly that named in the contract. And the sum needed at the outset of the year to fulfill the conditions of the contract is the present value of that sum discounted at any fixed rate of interest. Now this last sum must contain a sum equal to the "cost of insurance" of the amount named in the contract for one year at the present age of the insured, and also the premium for endowing that sum for the year, since the contract pledges that payment both in case of death or survival, which is to say it pledges the payment of that sum once in any possible event. This is as certain as that the said sum must embrace two halves or four quarters, and Mr. Craig is so far right, and has correctly quoted me. But the contract does not stipulate that both the conditions shall be satisfied at once in any individual case. Hence it follows that in every case eventuating as a death-claim, the premium of endowment (initial pure endowment reserve), with its interest, is available to help pay the death-claim, and in every case of survival the "cost of insurance" (which then takes the name of endowment profit) is available to help pay the endow-

ment claim. No matter what the number of claims to be settled may be, no assessment upon one such policy to meet the claim under another is necessary. In other words, no policy-holder could with justice be required to pay anything toward the claims of others without acquiring an exactly equal claim to receive from them.

But go back one or more years in the history of the endowment insurance policy, and the equitable cost of one year's insurance for the amount of the policy, as known to Mr. Craig, and, indeed, to all of us, and the endowment profits no longer agree, the former being always the greater sum, and holders of continuing policies will be exposed to contribute, or pay the difference at least, towards the claims of the representatives of decedents. There will be no necessity of their paying more, because to adopt a mode of account-keeping which would involve that, would needlessly duplicate transactions. It would be like requiring merchants not to settle their mutual debts by the payment of balances. Indeed, not to reckon these differences as the true costs of insurance under an endowment insurance contract is as inconsistent and confusing as it would be not to distinctively recognize the full cost of insurance on the one hand, and the endowment profit on the other, when a separate contract for each is employed, as it may be. I do not know how these remarks will impress others, but to my mind they serve to show the economy and wisdom of the endowment insurance contract, and the undesirability of covering the same contingencies by separate ones.

Mr. Fackler: Mr. President, there is one point that I think should not go unnoticed. On page 46, Vol. V., Mr. Craig has a table showing the cost of insurance on a ten-year term policy, and in the column headed "Advance Cost," age 90, he states the cost of insurance in the tenth year to be zero. Now, I cannot agree with him that the cost for that tenth year, during which the assured is ninety-nine years of age, can be considered as zero. I think it must be nine hundred and sixty-one dollars and some cents. It is the discounted value of $1,000 at the beginning of the year. The premium for a ten-year term policy, issued at age 90, is some $364, which, added to the reserve at the end of the ninth year—$597—would give the premium for the one year's term insurance at the age of 99. It seems to me that in so far as I differ from Mr. Craig in my view of the subject he has discussed, the difference may be attributal to his considering the advance cost in the tenth

year to be zero when it is really $961. I believe Mr. Craig has assumed that the reserve at the end of the year must be a thousand dollars instead of zero. He says, on a ten-year term policy issued at the age of 90 the reserve is one thousand dollars at the end of 10 years. Therefore, the amount insured will be a thousand dollars less a thousand dollars, or nothing, which will make the cost of insurance zero, as stated. Now the reserve at the end of the tenth year, on any ten-year term policy issued at the age of 90, would be considered as zero, beyond question. Therefore, the amount insured in the tenth year is a thousand dollars in full, and the single premium for that year is $961.

Mr. Craig: Wright's Life Savings Bank Book clearly expresses the idea which I intended to convey. On page 29 he takes a whole-life policy issued at age 32 and carries it through to the end of life, or to age 100; and in this table he states the company's risk at age 99 to be zero. And, of course, if the risk is zero, there can be no cost; and if a whole-life policy, issued at age 32, can just as well be called a term policy for 68 years, the principle would be precisely the same in the last year of the term policy for 68 years, issued at age 32, and a ten-year term policy issued at age 90, the term of years would not affect the truth underlying the discussion. In Barnes' New York Insurance Department tables, also, in the last year of a life policy the terminal reserve is stated to be one thousand dollars.

Mr. Fackler: I am glad that Mr. Craig has produced this book, because it certainly gives ground for his statement. The reserve at the end of the last year is put down as $1,000 in Prof. Wright's book, which is clearly wrong. It ought to be zero, because the reserve at the end of the year before is $943.50, and by Prof. Wright's own accumulation formula he would add to that $18.04, the net premium, which would bring it to $961.54, and then he deducts $C+C_x=\$961.54$, leaving zero to be accumulated to the end of the year. I think our Mr. Wright here will recognize this as correct.

Mr. Wright: My father was treating that as an endowment fund. If he were giving it the form of a life policy you are certainly right.

LEVEL PREMIUM LIFE INSURANCE. HISTORICAL NOTE. JOSEPH A. DE BOER. PAGE 49, VOL. V.

MR. HENDRY: It was a difficult matter in my own mind, after reading Mr. DeBoer's article, to know where to begin. There are a great many excellent things in it, but it seemed to settle down into the last clause here, where he says that these ratios, the dividend or surplus ratios, may be examined in the light of the expense ratios, and that "the expense account of the future calls for a revision." That is a matter which has been considerably discussed in the papers and otherwise, in reference to the expense of management, and his Table VIII. here would call to my mind, as it would probably to each one of you, a state of affairs that probably, as Mr. DeBoer says, is worthy of consideration. It is a question whether we, while going forward, would not do better, may be, to take a backward step. It might be considered a backward step, if we so choose to look at it. But when the expense of management from 1872 to 1896 increased from .886 to 1.327, which is something in the neighborhood of fifty per cent or a little more, while a very large amount of insurance had accumulated in the meantime, by which the expense should have been very materially reduced, coming under the heading of renewal premiums, it gives us food for reflection. Now, a very great deal of new business has been done, I am aware, during that time. And it is a question whether there has not been a little too much of it for the matter of profit in the business. Whether it has been money well spent by the members to take in new business at such a price as it has cost is open to question. It is, I think, for each of the companies to consider whether they are able to take in material profitably at such a price. The expense of management here seems to me, without a closer calculation which I would require to make in reference to those that I could reach more closely at home, to be quite too high, and they would not quite fit here, for the reason that a very large amount of insurance, included in this table, was in force at the time that our companies in Canada came into existence; in the year 1870 my own company came into existence, the "Sun" about the same time; the "Confederation Life" about one year later; the "Canada Life" had been in business from 1847, but the business was so small at that time that we could get very little value out of their experience gained then. At the same time, I am quite well aware, without having gone closely into it, that the expense

of management in Canada has been very much less—has certainly not increased to this extent. On the other hand, we find the management expenses given to the premium income increase in about the same ratio, or a little more. They, however, are about fifty per cent higher. Now, there is another point that would certainly come in. If this premium income were considered as *new* premiums then it might be different. But it takes in the whole amount of business there, renewals as well as the new, and it does seem to me that the cost is entirely too high, and it would appear rather an unprofitable business, though it is for the respective companies themselves to understand what it should be. I don't know but we are all round paying entirely too much for our business, and one of the reasons is that there are entirely too many companies in the field. Twenty years ago we got our business just at half of what it is costing us now. Every new company that has come into the business in Canada has immediately increased the cost of business. As more agents come in and but a limited amount of work possible to do, they have all got to live. The effect is the companies have apparently got to pay for it, whether it is a profitable business or not. Again we find that the interest on the assets given in 1872 as 5.78, increased up to 6.14, and then it has gone down to 4.56; this is only seventy-five per cent. of the former amount of interest. So that there does seem to be something here that requires considerably more than talking about. It appears to me as if it were necessary to give this matter proper consideration; and that may not amount to much unless put into active practice, and a lower rate of cost be the result.

Mr. Hemperley: I have read this paper and examined these tables with great interest. They are a magnificent tribute to the character of our business. Millions upon millions received, invested, returns collected, results distributed according to a prearranged system, and meeting expected contingencies, when stated in figures alone, impress the observer with their magnitude, but when they are expressed in terms of flesh and blood, of human happiness and human suffering, when they are transmuted by the alchemy of love and sympathy into the sunshine of Heaven and the dew of earth, they bring before us themes which enrapture the poet and the philosopher, as well as the scientist, and make us thank God that He has put it into the minds and hearts of men to conceive and to execute so great a blessing.

Let others analyze, dissect, compare and conclude, I am satisfied

for the present to gaze in wonder upon the past and trust for the future that, so long as morning and evening, summer and winter, seed-time and harvest shall not fail, so long will the powers given to us by our Creator be employed for the mutual welfare, moral, physical and spiritual, of ourselves and our fellows.

NOTE UPON THE LEGAL RATIO OF 15½. WALRAS. TRANSLATED BY H. W. ST. JOHN.

PAGE 61, VOL. V.

MR. TATLOCK: It is a pleasure to acquiesce in the expressed hope of Prof. Walras that there may be founded a recognized school of economists, "consisting of those who *do* demonstrate their conclusions," for nearly a quarter of a century after the enunciation of that hope, the realization thereof is still deferred. Now, more than ever before, is there needed, of a surety, rigorous thought and exact, as well as close, reasoning in the discussion of questions of political economy. The factors which enter into the determination of the answers to these questions are so numerous, and their apparent importance varies in such a high degree with every difference of phase in which any given question may be presented, that a judicial mind, accustomed to marshal facts and factors in the order of their permanently relative value and influence, is alone able to bring order out of the chaos and to throw lasting light upon the salient points. By reason of the relative scarcity of clear and exact thinkers economic fallacies flourish and increase to an extent which, seriously considered, is absolutely appalling.

Prof. Walras' review of the paper of M. Cernuschi is largely an illustration of the principles of demonstration of which Prof. Walras is so earnest an advocate. He shows very clearly how the "Problem of the value of Money" is completely solved, on mathematical principles, in the case of the single standard, and how, on the other hand, in the case of the double standard, that the problem is really indeterminate, the final and accepted result in any given case being dependent upon an arbitrary establishment of the ratio of the two constituents.

Prof. Walras seems to concur in the belief, advocated by M. Cernuschi, that the establishment of the legal ratio between silver

and gold of 15½ would be a beneficent act. His reasoning is a trifle obscure, but he appears to assume that the mechanism of exchange would so conform to the legal regulation of the relation between its standards of value that the actual relation between them would vibrate within comparatively small limits. After the lapse of twenty-one years, and in view of the recent rumors concerning the opening of the French and Indian mints to the free coinage of silver at the fixed ratio of 15½, his remarks are of decided interest. It is impossible to believe that he could now, in the light of present conditions, still advocate a measure which would immediately enhance the value of the enormous existing stocks of silver to a figure more than double its present market price, or that he would still be willing to ignore, as he certainly did in the paper under discussion, the workings and operation of that principle which is known by the name of Gresham's Law.

REMARKS ON THE ADDRESS OF THE PRESIDENT, MR. EMORY MC CLINTOCK, AT THE SPRING MEETING OF THE SOCIETY, APRIL 29TH, 1897.

PAGE 74, VOL. V.

MR. LUNGER: Those who are called on to advise a young man on any subject that pertains to his welfare, must feel that any views they may express should be carefully weighed before given. When it is considered that so much of the happiness, success and usefulness of life, depends upon the selection of a suitable occupation, to advise a young man upon this important subject becomes a responsibility so grave that it is entered upon with hesitancy and concern. The responsibility is necessarily felt more keenly when the mind of the person seeking advice is directed toward our profession, restricted as that profession is by the small number of clients who desire to avail themselves of our services and knowledge. Doubtless nearly every member of this Society holds decided views regarding the advice which ought to be given to one who aspires to become an actuary, but the views held by one of long experience and who has attained great eminence in our profession must either strengthen or modify our personal convictions; therefore Mr. McClintock, in presenting to us in his last address, as President, his opinions upon the advice to be given to one who contemplates entering our profession, has

rendered each member of the Society a valuable service, and has very appropriately fulfilled one of the chief functions of the presidential office—that of guiding us in matters pertaining to the welfare of our Society. The future success of this Society will largely depend upon the ability and qualifications of those who enter our ranks, and certainly no one should be encouraged to seek for employment in a life insurance office, with the idea of ultimately becoming an actuary, unless he fully understands the magnitude of the obstacles he will have to overcome.

I use the expression "seek for employment in a life insurance office" advisedly, for our profession is a peculiar one in that the opportunity must come before the most important preparation for its manifold duties is entered upon. I do not know of a single member of this Society who, before becoming connected with a life insurance company, deliberately took up a course of study with a view to qualifying himself for the position of actuary. It is true that about twenty-five years ago, when the number of actuaries was small and new companies were being constantly formed, several men of experience and standing were called upon to become actuaries, but even in these cases a full knowledge of what was required in the position could only have come after the appointment was made. In some cases the preparation has been assisted and shortened by a thorough knowledge of mathematics, but in the main I believe that it will be found that even this essential qualification was acquired after the mind had become impregnated with the actuarial germ while engaged in clerical work, actuarial or otherwise, in a life insurance office.

When we consider that those unconnected with life insurance offices who are led to inquire into the possibilities of success in our profession are generally influenced by reports of various kinds, chiefly in respect to the supposed large salary of the actuary, and that one who is actuated solely by sordid motives is not likely to attain success in any calling, we are prepared to understand that the true inspiration to enter our profession can hardly be engendered except amongst the associations of the office. The evidence of this is found in our own membership, which is made up almost entirely of those who have come from the rank and file in our offices. I believe that under the conditions which now prevail, the actuaries of the future will be fostered in our offices to even a larger extent than in the past.

Mr. McClintock very pertinently points out that comparatively

few companies have been formed in recent years, and there is no reason to believe that many will be established in the near future. The field of the actuary is, therefore, practically confined to the existing companies. Even if new companies were being formed, I question whether it would be justifiable to encourage a young man to study for our profession. The success of a new company would depend not only on the ability with which it would be managed, but also upon conditions over which even the most astute manager could not exercise control. We know that even with the most favorable conditions the number of men who are competent to manage a life insurance company is extremely limited, and that such men occupy positions which they cannot afford to sacrifice for the purpose of entering upon a venture. New companies when formed are therefore generally managed by men who, while they may have been successful in other lines of business, have had no practical experience in life insurance. The outcome almost invariably is that the available funds of the company are spent in purchasing a fair experience for its officials. By the time the experimental stage has been passed, the funds of the company are depleted in this way, and re-insurance follows. Hence a position with a new company can at the best be only looked upon as a temporary expedient or an insecure stepping-stone to another position. The same difficulty that a new company would have in securing the services of a tried manager would present itself if it desired to employ an actuary. Moreover it will be found, as a rule, that in new offices actuarial work is a growth, and that by the time there is need of a person to give his entire energy and attention to actuarial matters, someone within the office has prepared himself to assume the responsibility.

It is well also to point out to the aspirant for actuarial honors that companies generally make their promotions from within their own ranks. The wisdom of this course becomes evident when one considers that pure theory, while it is the basis of all actuarial knowledge, plays only a subordinate part in the every-day work of a successful company. Practical experience is the first essential, and the actuary must of necessity be familiar with the methods of his office in all its various departments, in order to deal intelligently with the many subjects that come before him. Moreover, a company that is mindful of the *esprit de corps* of its employés would be careful not to dishearten or discourage them by affording to the newcomer opportunities not accorded to those who have

been for a long time in its service. The beginner who enters a large office must of necessity take his chances along with a number of others. The tendency in such offices is to give the clerk a certain routine duty to perform. In this special branch he may become proficient, but the opportunities of gaining information with regard to the working of other sections of his department will be few, and it will be almost impossible for him to acquire a knowledge of what is going on in other parts of the office in which he is employed. Only those, therefore, of superior ability will push forward into the front rank, and those who are able to do this will not be overlooked when the opportunities for promotion occur.

The successful actuary is not merely a mathematician. In order to properly advise his company he must be a man of broad experience in dealing with practical affairs. He must be thoroughly in touch with the business policy of his own and other companies, and not only with the work of the office but also with that of the field. He must also possess a considerable knowledge of law and of State legislation and it is desirable that he should be versed in the medical selection of risks. The acquisition of this all-round knowledge in a large office, requires not only an unusual mental equipment but also long experience and infinite attention to details, and these qualities should be supplemented by a strong physical constitution. It is not an easy matter to spend several hours a day upon clerical work requiring the closest attention, and then go home to read and study. Under the most favorable conditions it would be many years before a person thus situated would become so proficient that he would be able to pass with positiveness upon the subjects that would be brought to his attention.

For these reasons the small office is, to my mind, the ideal training school. Here it is possible for the beginner to become thoroughly versed in our profession and in all the practical workings of the business. His actuarial duties are not apt to entirely engross his time, nor will he be called upon to give his exclusive attention to a certain line of routine work. At one time or another he will be brought in contact with every branch of the business, and if he learns his lessons well they will stand him in good stead if he should be called upon to fill an actuary's chair. Moreover, in the small office there are greater possibilities of advancement to other official positions, and of being invited to fill a vacancy in a large company.

Even when proficiency is attained, an actuary must keep in touch with all the discussions of the day and with the new questions that arise, for otherwise, like the lawyer who neglects the latest decisions, he is apt to fall behind in the race. The strain of preparation, even under the most favorable conditions, and the continuance in active service after proficiency has been reached, require the possession of a strong constitution and careful solicitude not to overtax its limitations.

Besides keeping abreast of the scientific progress of his profession and the practical workings of the business, the actuary should be thoroughly in touch with the needs and requirements of the agency force. That force must look to him for advice and a kind of assistance which can come from no other officer of the company, and no actuary can do his best work for his company unless he is thoroughly in touch and in sympathy with the agents and is prepared to do all that he consistently can to make their arduous work easier. I do not mean that an actuary should yield to every request that is made by an agent, or that he should hold the interests of the agent paramount to those of his company, but he should be extremely mindful that the company cannot be made a success without the agent ; that the agent works under peculiar difficulties and is constantly facing an opposition more active and vigorous than is known in any other business ; that in his work he comes in contact with those whom it is the desire of the company to serve and please, and is therefore better posted upon their requirements and idiosyncrasies than the official whose duties keep him within the confines of the Home Office. If sympathy for the agent is felt by the actuary, the latter is capable of supplementing the work of the agency department better than any other official, but if this sympathy is lacking there is danger that cold water may be constantly thrown upon that branch of the business which goes further than any other to bring about progress and success, and without which all the splendor of the greatest institution would speedily dwindle to nothing.

While the usefulness of our profession would be increased by the constant accession of keen and cultured intellects, and while we would all be glad to extend a helping hand to the beginner, we cannot consistently, in view of present limitations and conditions, paint a bright picture of the future of one who would seek his life work amongst us.

Mr. Macaulay : Mr. McClintock's address supplies an answer

to a question which is very frequently asked, and supplies it well. There are, however, a few thoughts which occur to persons in Canada, perhaps more so than to persons living in the United States because office arrangements with our Canadian companies are not identical with those in the American companies. At the very beginning we have to consider what really is the function of the actuary? Should he be merely a mathematician, a man who deals with reserves, methods of dividing profits, and the cost of assurance; or should he be a man of much broader education? In my judgment the ideal actuary should be a great deal more than a mere mathematician. He should be thoroughly posted in regard to the law of life assurance, and to the underlying principles of policy contracts; to all questions connected with mortality, as affected by residence, selection and occupation; to securities and forms of investment; and to all matters which are likely to arise in connection with the management of a life assurance company. In other words, the ideal training for the actuary is the same as the ideal training for the manager of a life assurance company, and the ideal actuary should be the ideal manager of a life company. What would we think, for example, of the captain of an ocean steamer who had to consult his lieutenant every now and again as to what he should do in this, that or the other contingency? Or what would we think of the manager of a large bank who had to consult his accountant every time that an importan question in connection with the exchanges, for example, arose? I think we would say that neither of these persons was fully qualified for his position. And yet, to a large extent, the managers of life companies are placed in an analagous position in regard to some of the important questions which arise in the conduct of the business. The manager of a life company ought to be thoroughly posted in all the particulars of his business, and to be able to direct his subordinates rather than to receive directions from them. At any rate, it will, I think, be admitted that, other things being equal, the manager who does understand his business thoroughly will be better able to make a success of his company than one who has not received that thorough intellectual grounding. And I think this is specially true of the smaller companies which are not able to pay such salaries as will induce first-class actuaries to accept subordinate positions. And what is true of the manager is also true, in a great measure, of many of the subordinate officials at the home offices of the companies. I do not mean to say that actuarial

knowledge is all that is required, but any man who possesses it has a great advantage over his neighbor who is without it. In Great Britain, to a large extent, the managers of the companies are actuaries. When a company there requires a manager its directors do not usually go outside of the actuarial ranks. In Canada that is not true to the same degree, but it is true to a certain extent, and it will, I hope, become more true as years pass by. There is in Canada a tendency to recognize the actuarial profession as specially qualified for the management of life companies. If, therefore, Mr. McClintock's young man were coming to me and asking me my views, I would tell him: "The number of first-class actuarial positions is very limited, and those who at present occupy them are, we hope, likely to be long-lived. The prospect of your becoming an actuary, or the manager of a company is, therefore, very poor. But the prospect of you becoming the head of a more or less important department at the home office of some company is fairly good. If you would be satisfied with that position the actuarial profession may suit you; but if you will not be thus satisfied I would advise you to think of some other walk in life."

Mr. Whiting: I disagree with the position which is taken by Mr. Macaulay in relation to the importance of the actuary in a company. I recollect, while in England, at one time I had the pleasure of meeting a certain gentleman who is actuary and manager of a company there, and after he had severely criticised our companies on the way we had gone into Great Britain and crowded up commissions, etc., he said, "How is it your American companies come over here and get more business than we do?" I felt uncommonly annoyed by his remarks previously made, and wanted a chance to get even with him, and I said, "I observe that your English companies are managed by actuaries. The result is precisely what you might anticipate. Your actuary is a man who is trained from the closet, who develops a peculiar set of views. His function is to see that the company gets enough premium to carry out its contracts. Now, if you put your actuary in control, the result will be that your company will have a well-regulated set of premium rates, but very few premiums paid. In America we manage that differently. We do not put our superintendent in the actuarial chair, because we know that his business is to get business. Precisely the same thing happens if you put your medical examiner in the chair. He will have a gilt-edged set of risks, that will be like insuring pig-iron under water. Nobody

will ever die ; but the result will be, you will get very few risks, and your agents won't stand it, and they won't stay long. Put your lawyer in the chair, and he will draw your contract so that when you get to the end of it the man won't be insured at all. The consequence is, you will never have any risks to pay, but you won't have any money, anyhow, to go on with the business. Suppose you put your financial man in the chair, what are going to be the results? He will naturally devote his attention to the problems of finance. He looks at that to the exclusion of other matters. He may invest your funds so solidly that they will get the maximum rate of interest which is compatible with the necessary degree of security, but he will never have a great deal to invest. In America, our scheme is entirely different. We don't put any of these men in the chair. We elect a man as president who has a sufficient degree of familiarity with the bearings of the departments which he is to supervise, without necessarily being an expert in either. Consequently, he is not narrowed down to the series of questions which belong to any particular department. His is a broad supervisory function. He should have sufficient information to be able to pick out his advisers, and then keep harmony among the whole. And in that way the American company marches on to success with equal steps, equally well balanced in all its departments ; and that is the reason, Mr. Calhoun, why your English companies don't stand in with us."

Mr. Ireland : The presidential addresses that have been delivered by Mr. McClintock have been notable, among other things, for the variety of topics that have been treated in them, and this observation leads to the query whether it would not be of great help to members of the Society, in preparing papers, to have subjects suggested to them. Perhaps many of the members who have not prepared papers at all would be tempted to do so if a subject were presented that appealed to them as interesting and important. I therefore make the suggestion that a committee be appointed to receive recommendations from all members of the Society as to subjects for discussion, and to prepare lists of such subjects for publication in the papers of the Society.

On a first reading of Mr. McClintock's paper of April last, on the subject of the actuarial profession as a means of livelihood, it seemed that his views were unnecessarily forbidding to the young man who contemplated actuarial studies ; but it must be confessed that the facts offer little, if any, more encouragement than the pros-

pect set forth in Mr. McClintock's paper. One may notice that the consulting actuaries occasionally lose an assistant by reason of his being called to a company office; and at considerable intervals the roster of our own members shows that there has been a promotion by transfer from one company to another; but except the few changes that have been brought about by death, the group of actuaries of companies has been wonderfully stable for two or three decades past.

One or two of the incidental points in the paper may, perhaps, be criticised. Mr. McClintock says that the reason "why there has not been for many years a single new life company successfully established is to be found in the requirement by the several States, as well as by Canada, of a net reserve on a standard basis." It seems to me that this does not cover the ground. Would it not be equally true to say that the reason was to be found in the fact that modern methods of doing life insurance business call for most unnecessary and extravagant outlay in the procuring of new business; so that it has been found impracticable to get capitalists to start in an enterprise that required so much outlay and so much patience before (by reason of age) there would be some return of profit, or even some releasing of their liabilities? Probably both causes have contributed to produce the effect. The career of the new companies started about twenty-five years ago gave every indication of the fact that new companies were not wanted at that time. The business of the old companies shortly after fell off, and the new ones had really no visible means of support. In these latter days the fact that there were already in existence companies ample to do the life insurance business of the country, and the fact that the new companies could hardly, under any circumstances, offer any greater inducements than the old companies, and, in the natural order of things, must offer materially less, have had very much to do with the fact that new level premium companies have not been established.

In the closing part of the address (the statement addressed to the young mathematician in person) the interesting helium illustration is used to show the kind of business perception that is needed in the successful actuary, and we read that to protect a company against loss, by reason of death occurring, from the risk due to occupation in the manufacture of helium, no part of the amount of insurance should be paid on deaths resulting from this exposure, "because every dollar paid by the company on the extra hazard,

without previous extra premium received against such hazard, is so much money given away without consideration"; but it must be remembered that if a helium worker, carrying an insurance policy on his life, dies as the result of his extra-hazardous occupation, the company is thereby relieved from all other risks that it had been carrying on this life; that is, from all danger of having to pay a claim on account of his death from any other cause; and that, therefore, in fairness and safety, the reserve that it had laid up to meet the future risks under this policy might well be paid to the representatives of the deceased. Forfeiting everything that has been paid in seems too drastic a remedy.

The paper as a whole will be read with serious interest by those of whom it treats, and will doubtless be the "Baedeker's Guide" for the future.

Mr. McClintock: The remark of Mr. Ireland in regard to reserves is undoubtedly right, but it is another illustration of the fact that a person who is talking to a certain auditor, with a certain object, may very easily use language which would require to be qualified, if it were to be taken up for criticism by some one else having special knowledge of the subject under discussion. This little remark of mine which he referred to was supposed to be addressed to a young man who knows nothing about life insurance, who knows merely that it is insurance, and that insurance means paying so much a year to cover a certain risk incurred during the year, just as a person pays for fire insurance or accident insurance; and such a person as that, knowing nothing about reserves, would not be the person with whom to discuss distinctions involving reserves.

Abstract from the Minutes of the Semi-Annual Meeting of the Actuarial Society of America, held in Springfield, Mass., on Thursday and Friday, October 7th and 8th, 1897.

FIRST SESSION.

Building of the Massachusetts Mutual Life Insurance Company,

Thursday, October 7th, 10.30 A. M.

The meeting was called to order by the President, Mr. Bloomfield J. Miller. After the roll call the President addressed the Society as follows:

Gentlemen of the Actuarial Society of America:

It is my pleasant duty on this occasion (our eighteenth semi-annual meeting) to call your attention to such matters of special and pressing interest as may occur to me, and to ask your individual assistance and influence in correcting evils which threaten, and effecting changes which will promote, the best interests of our life insurance companies, which are usually identical with the best interests of the policy-holders therein.

In the United States the actuary is not primarily a business manager; but in many of the most fundamentally important factors involving the welfare of the business, the actuary is the only officer of the company competent to properly consider and advise in regard to the practical course to be pursued. As the conclusion of the actuary is often incapable of a direct mathematical demonstration, it is especially important that he should, so far as practicable, be justified and upheld by the expression of similar opinions by such of his fellow-actuaries who are in agreement with him. Our Society, by the publication of papers and discussions, can and does exert a large and practical influence upon the proper conduct of the business of life insurance, although I think it will not be disputed that it is in its power to exercise a much wider influence than it has hitherto done if its members will still further exert themselves to contribute their quota to the sum of published knowledge and opinion. While the Society is prevented by its

constitution from expressing or indorsing an opinion, the published views of its individual members go far to act as an efficient substitute for a resolution or vote of the Society.

I would respectfully urge upon our several members the importance of doing what they can to promote wise legislation and a judicious exercise of the powers appertaining to the Insurance Commisioners of the different States.

In no country have life insurance companies been so much bothered, hampered and restricted by law as in the United States, and all has been done with the idea of protecting the public from loss owing to ignorant or dishonest management; and yet assessment and flexible premium companies have been practically exempt from governmental control, and have been free to delude or swindle the public with impossible or fraudulent plans. This should be corrected. No company should be allowed to do business on plans which can only result in failure and in disappointment. The law should do with assessment companies what it does with regular companies, viz., compel them to do business on scientific principles. They should either maintain an adequate reserve or provide for increasing assessments based on the attained age of the insured.

So-called "flexible premium" companies, which issue policies on the level premium plan and simply retain the right to raise the premium rate in case of need, should be compelled to maintain the same reserve as regular companies. It is quite usual to consider that the possession of the full net reserve is a test of solvency, and that the obligation to maintain the reserve is imposed on the regular companies solely for the purpose of insuring solvency. This is a very narrow and misleading view of the matter. It is an indisputable fact that most of our regular companies might have their net reserves impaired ten or even twenty per cent., and might still, by careful management, be able to reëstablish their reserves and fulfill all their contracts. This consideration precludes the idea that the sole purpose of the reserve is to insure solvency. A fuller and truer view of the reserve is that it represents moneys which, by the fundamental theory upon which premiums are calculated, have been collected to meet obligations not yet matured, and that it must be sacredly held in trust for that purpose only.

A company with an impaired reserve should not necessarily be thrown into liquidation, but it is just and reasonable that it should not be allowed to issue new policies until the impairment of

the reserve is made good, as under other circumstances new members would be required to bear a portion of the burthen which should be carried by the old members themselves. In every healthy company the old and new members each pay their own way and carry their own loads.

A flexible premium company has no more right to squander its mathematical reserve than a regular company, and should not be allowed to write new policies unless it can show that the moneys collected from old members to meet as yet unmatured obligations are still in hand and intact.

Suppose a regular company, with a reserve of $100,000,000, were to secure the consent of all of its members to the insertion of the so-called "safety clause" in their policies, by which the company would have the right, if it saw fit, to raise the current rate of premium or to call for extra and additional premiums on policies which were nominally paid up by their terms, would that justify the company in spending its $100,000,000 of reserve and then seeking to make good the deficiency out of "new business"?

The instant that any company undertakes to collect premiums in advance to meet obligations which will not mature until future years, it should be required to reserve such moneys until the time comes for their legitimate use. This obligation should rest upon a flexible premium company just as much as on a regular company, and in neither case should a company with an impaired reserve be allowed to write new business.

An objection is sometimes made to the legal requirement of an intact net reserve in that it prevents new companies from competing successfully for business with the old companies, because the new companies cannot bear the initial expenses incident to new business without trenching on the reserve. At first sight this might seem to be an evil requiring correction, but it is doubtful whether the new company would succeed any better if it were exempted from the necessity of maintaining the reserve; even then it could not offer to the public with safety any more desirable contract than could be obtained from the older companies which have passed beyond the experimental stage, and its high expense rate would preclude the idea of its being able to give cheaper insurance.

In no business does age and attained success give so many real advantages to well-established organizations over new and experimental ventures as in that of life insurance. It is difficult to see how a new life insurance company can offer the same security and

advantage as the old, well-established companies, unless it can satisfy the public that its business will be run more economically, and if it can do this it will not find any difficulty in maintaining the reserve. If, with all its other disadvantages, it had an impaired reserve, it would be still more heavily handicapped in its competition with the older companies.

The numerous Insurance Departments of the United States have, on the whole, been considerate and reasonable in their treatment of life insurance companies. Their power to annoy and harass the companies is almost unlimited, but it is greatly to their credit that they have rarely subjected any company to serious inconvenience without a reasonable and justifiable end in view. The Departments are entitled to much praise for their efforts to provide uniform blanks for financial statements, but they sometimes call for schedules and exhibits which are practically valueless, although their preparation is attended with an enormous amount of labor and expense. I have in mind particularly the schedule of loans on individual policies assigned to the company as collateral, and the "Gain and Loss Exhibit." The former is of no interest to the Department so long as it is assured of the total amount of such loans and that they are in every case within the policy reserve. The latter is absolutely misleading and mischievous.

No company can, within the short time allowed for the preparation of the "Gain and Loss Exhibit," do any more than guess at some of the most important items; such, for instance, as the tabular cost of the insurance for the year just ended, and every company must force the balance. An exact balance could not be made, no matter how much time were given to its preparation. The "Gain and Loss Exhibit" should be abandoned as leading to false and misleading comparisons between the companies. The only item in it of real value and interest is the amount of reserves on lapsed and surrendered policies. A comparison of this item with the amount allowed for such policies, as shown by the financial statement, would show the company's apparent gains from discontinued policies much more fairly and accurately than the present form of "Gain and Loss Exhibit," in which some companies mix up payments on account of tontine surplus with payments for surrender values, pure and simple.

With reference to life insurance legislation, it is my opinion that no "Deposit" laws should be enacted by any State applicable to

the companies of any other State, except that such companies should maintain a deposit with the authorities of their own States for the benefit and protection of all policy-holders.

A deposit in each State of $100,000 would amount in all to over $4,000,000 for each company, and would be attended with great inconvenience to the companies, besides imposing great and unnecessary financial responsibility on the insurance officers of the several States.

The deposit made in one State for the protection of *all* members can be reached, in case of necessity, by the policy-holder in any other State with about the same facility as a deposit in his own State, and experience has not shown that such deposits have served any important end, except to prevent entirely irresponsible organizations from entering the insurance field.

I do not think any non-forfeiture legislation is required, in view of the fact that all of the companies now incorporate clear and fair non-forfeiture clauses in their policies ; but such legislation, if had, should relate only to domestic companies.

The different States cannot adopt inconsistent non-forfeiture laws, making them applicable to companies located in foreign States, without compelling companies to withdraw from every State which may have adopted non-forfeiture laws incompatible with the laws of their own State ; and if all the States adopt uniform non-forfeiture laws, nothing would be gained by making them applicable to companies of foreign States.

A general law prohibiting any company doing business in the State without incorporating clear and specific provisions for one or more kinds of surrender value (cash, paid-up insurance or extended insurance), one of which should apply automatically, might be applied to companies of foreign States without inconvenience or friction ; but the law should not undertake to prescribe the form or amount of the surrender value. That can be safely and properly left to the companies themselves, so long as the non-forfeiture provisions are so clear and definite that the insured knows exactly what his rights are. When a State undertakes to fix the rule upon which surrender values are to be allowed, it is liable to abridge rather than to extend the privileges which the companies are able and ready to grant to the policy-holder. Thus the Massachusetts non-forfeiture law makes it impossible for Massachusetts companies to grant automatic surrender values in the form of extended insurance, and yet a very large proportion of the insured might

prefer an automatic surrender value in the form of extended insurance than in the form of cash or paid-up insurance.

I do not think that any reason exists for the adoption of a higher legal standard of reserve than the four per cent. standard now in use; but it is rather important that the two States having a four and a half per cent. standard should change their standard to the four per cent. basis, so as to conform to that of the other States and thus obviate the necessity of a separate valuation. I refer to the States of Texas and Nebraska.

Life insurance legislation should never be extreme, and the companies themselves are better judges of the time to adopt a three or three and one-half per cent. interest basis than the legislatures or Insurance Departments are likely to be.

I lay no claim to infallibiiity, but I conceive it my duty, as well as that of my fellow-members, to express ourselves on the foregoing matters, which are now well in the front, and all of which have an important bearing on the future welfare of the business of life insurance.

Officers and members present at roll call and during the sessions:

Officers and Council—Bloomfield J. Miller, President; George W. Phillips, 1st Vice-President; Oscar B. Ireland, 2d Vice-President; Israel C. Pierson, Secretary. Other Members of Council—Sheppard Homans, David P. Fackler, Howell W. St. John, Emory McClintock, Walter C. Wright, William E. Starr, Elbert P. Marshall. Members—James M. Craig, George Ellis, Robert P. Field, Frederick W. Frankland, John K. Gore, William Hendry, Charles Hildebrand, John M. Holcombe, Robert W. Huntington, Jr., James M. Lee, Thomas B. Macaulay, William A. Marshall, Walter S. Nichols, Maximilian H. Peiler, Edward J. Sartelle, William S. Smith, Joseph H. Sprague, Morris W. Torrey, Archibald A. Welch, Daniel H. Wells, William D. Whiting. Associates—Samuel S. Hall, Douglas H. Rose.

The minutes of the Annual Meeting, April 29th, 1897, were approved as printed.

A summary of the business transacted by the Council was presented by the Secretary and approved.

On the unanimous recommendation of the Council the Society, by unanimous ballot, elected to membership Mr. Omer Lepreux, Director General of the "Caisse Générale d'Epargne et de Retraite,"

48 Rue Fossé-aux-Loups, Brussels, Belgium; President of the Permanent Committee of the International Congress of Actuaries, and Vice-President of the "Association des Actuaires Belges."

The Council reported that the following named persons had passed the examinations for Associate Membership:—Samuel Stickney Hall, A. B., Douglas Hall Rose and Charles Hart Angell, A. B.

The Council recommended an amendment to the By-Laws, as follows:

Add to the first paragraph of Article IV. the following: "Except in the case of members not residing on this continent, who shall pay $5.00."

If the Amendment be adopted, the paragraph will read: "Each member shall pay $10.00, and each associate $5.00, upon entrance, and a like amount at each Annual Meeting thereafter, *except in the case of members not residing on this continent, who shall pay $5.00.*"

It was voted to print it in the minutes, and give the required notice that it would be brought up for consideration at the Annual Meeting, April 28th, 1898.

On motion, the Secretary was requested to communicate with the members of the Society, and ask those who expect to attend the Second International Congress of Actuaries, to be held in London on May 16th–20th, 1898, to notify him by January 15th.

The President announced, with regret, the death of one of the members, Mr. Jacques Martin-Dupray, in Paris, on September 12th, 1897, and stated that a minute, expressive of the loss sustained by the Society, would be prepared. (See page 194.)

The Society then listened to the reading of new papers. (See pages 109–151.)

Adjourned at 12.30 P.M.

Thursday, October 7th, 1897, 2.30 P.M.

The reading of papers was continued, after which the members engaged in the discussion of papers of the Annual Meeting, April 29th, 1897. (See pages 152–185.)

Adjourned at 5.30 P.M.

Thursday, October 7th, 1897, 7 P.M.

The usual dinner of the Society occurred at the Massasoit House. President Miller presided and acted as toast-master.

The after-dinner speakers were Messrs. James M. Lee, Thomas

B. Macaulay, R. P. Field, James M. Craig, Walter C. Wright, William Hendry, John M. Holcombe, Archibald A. Welch, Emory McClintock and Sheppard Homans.

The dinner was adjourned by the singing of "Auld Lang Syne."

Friday, October 8th, 1897, 9.30 A.M.

President Miller in the chair. The discussion of papers was continued.

On motion of Mr. Gore, the following resolution was adopted:

Resolved, That this Society tender to Mr. Oscar B. Ireland and to the other officers of the Massachusetts Mutual Life Insurance Company, the expression of its hearty appreciation of the large-hearted courtesy and hospitality extended to its members, in sending in advance to the members charming views and descriptions of Springfield and vicinity, in providing for the Society meetings a commodious and beautifully decorated room, and in contributing in every way to the comfort and social enjoyment of the ladies accompanying the members as well as of the members themselves.

The Society adjourned at 11.30 A.M.

The members of the Society, and the ladies accompanying them, were guests of the officers of the Massachusetts Mutual Life Insurance Company on a trip by electric cars to the summit of Mt. Tom, where lunch was served.

ISRAEL C. PIERSON,
Secretary,
21 Cortlandt St., New York.

Jacques Nicolas Martin-Dupray, a member of this Society, died at his residence in Paris on September 12th, 1897. M. Martin-Dupray was an actuary of unusual distinction, taking a prominent part in the management not only of his own company, the Assurances Générales, one of the largest in Europe, but also, in advice and consultation, of other important companies, and being at the time of his death Vice-President of the Institute of French Actuaries, as well as an honored member of various actuarial bodies in other countries.

M. Martin-Dupray was born in Paris on December 6th, 1845, and has been connected with the "Compagnie d'Assurances Générales" since 1866, becoming its Actuary in 1878. In 1889 he received, from the jury of the international exhibition of that year, a gold medal for his work in connection with the French mortality tables, and about the same time he obtained also the distinction of "Officier d'Academie." He had previously received a decoration from the government of Portugal—the cross of the Order of Christ—for a report which he had made on the subject of the Portuguese finances. He was also prominent in philanthropic matters, being an officer of two benevolent institutions at the time of his death. His health was not robust, but his final illness was brief and the announcement of his death came as an unexpected distress to his wide circle of friends in all countries.

VOL. V. NO. 19.

PAPERS AND TRANSACTIONS.

APRIL 28TH AND 29TH, 1898.

THE LIMITATIONS OF THE SYSTEM OF NET VALUATIONS.*

WALTER S. NICHOLS.

INTRODUCTORY.

THIS topic is not of my own selection. It had been chosen by my friend, the late Mr. Sheppard Homans, as a subject of personal interest. In attempting, at a late hour, to treat it by request, I shall not presume to take his place nor to proclaim what I might imagine to be his views. His long and prominent service in the cause of life insurance had placed Mr. Homans in the front rank of American actuaries. His kind heart and unassuming ways had created strong ties of personal esteem on the part of those of us who recognized the high order of his talents. The eulogy, so familiar in America, was unspoken at his burial. They laid him away with a simple service for the dead, but honored as a man whose death was felt to be a public loss. These few words of personal tribute seem fitting in this connection to one who was a member of the first International Congress of Actuaries and a participant in its proceedings.

When Dr. Sprague, in a report to the last International Congress, had summarized and extended those sentiments regarding the valuation of policies in relation to the expense of new business which he had previously advocated in the *Journal of the British Institute of Actuaries*, Mr. Homans arose and expressed his hearty concurrence in the general views of that eminent actuary. He then remarked that the same logic which justified an extra expense for new business necessitated a recast of the method of determining the

* This paper also was presented by Mr. Walter S. Nichols, one of the delegates of this Society, to the Second International Congress of Actuaries held in London, May 16th—20th, 1898.

proper net reserve. The system of net valuations, he declared, "is in no proper sense a final or complete test of solvency. It is rather a means of demonstrating that the fundamental conditions governing the business have been faithfully observed and carried out." The thoughts that were uppermost in Mr. Homans' mind seem obvious. I suspect that he was thinking of the serious defects which our American system of net valuation had developed, of young and struggling companies which he had seen strangled through its misapplication, of the fallacious tests of insolvency and relative strength by which the American public was often misled in official reports, and perhaps more than all of the inequities which were forced upon his own contribution plan of dividends through its misuse. At any rate, it is on these general lines that I propose to discuss the topic.

As is well known, the net valuation method is the central feature of the whole American system. To understand the full significance of this fact a brief historic retrospect is needed. In Europe life insurance was a natural growth in which the development of its scientific principles went hand in hand with their practical application. In America it was an exotic introduced as a business known to be successful in England. With us it was considered a commercial undertaking to be conducted like fire insurance or banking, with both of which it was frequently allied in the earlier institutions which preceded our present companies. We borrowed our rates and contract forms from abroad, and with little knowledge of the principles at first, treated this business as an ordinary mercantile venture, requiring only the skill of the accountant to adjust the income and outgo of the company. If an apparent surplus arose the methods of the banks and fire offices suggested its proper treatment. The actuary was almost unknown. Epidemics were objects of dread. Apprehension that the death-rate would prove excessive and render the borrowed rates inadequate, for years overshadowed all other questions. Under such conditions the soil was ripe for implanting a system of net valuation. As in a bank or fire company, the cash in hand, after providing for the obligations, represented to the practical managers the surplus payments, which in true mercantile fashion should be returned as dividends.

A previous experience with other classes of financial institutions, too, had helped to formulate our life-insurance system.

Wild-cat banks had cursed the country. Two great fires in 1835 and 1845 had overwhelmed our stock fire companies. Swarms of

irresponsible mutual corporations had been organized in their place, whose rapid failures became a public scandal. The natural result of both was an attempt to remedy the defects in our financial institutions by legislation, whose cardinal feature was a sufficiency of funds in hand to balance outstanding obligations. The chief financial officers charged with the enforcement of these laws in two of our principal States soon found their task too heavy, and separate departments were created for insurance. Thus began our State supervision. By one of those seemingly unimportant accidents which sometimes determine momentous issues, the supervision of insurance in Massachusetts was soon intrusted to Elizur Wright, a former teacher of mathematics, and a man of undoubted genius, who had been prominent as a consulting actuary, and was a politician as well of pronounced and radical views. He found the laws intended to secure the proper management of insurance utterly worthless, and set about to correct this evil by what he conceived to be the only sound business rule. The practice of the companies must conform to their theory. The tabular net premium must be applied according to the assumptions on which it had been computed, and the loading must be applied just as the theory called for. A well-managed company thus restricted could not fail if its original assumptions were adequate, and if they were not their inadequacy would soon be disclosed. No injustice would be done among the members, nor extravagance be indulged in by borrowing from the future to aid the present. Like a bank or trust company, insurance expenditures would be limited to cash in hand, on which the future had no lien. Thus indirectly the State would safeguard the sound management of the company. A doctrine so mercantile, so simple, and, in the main, so reasonable, proclaimed by a State official and enforced by legislation, coming at a time when the questions of safety and dividends under a vigorous competition of new companies were paramount in the minds of an unenlightened public and accentuated by failures abroad, was accepted with little protest.

When reinforced a few years later by the failure of a foreign company which was unable to stand his test, few in America at first had the hardihood to arraign a net valuation as a fallacious test of sound management. But it is safe to say that neither its sponsors nor American life experts in general realized all the results that would flow from the adoption of this governmental standard. The substitution of the idea of solvency for sound management in

its popular conception was a logical and almost necessary result. As the true determinant of surplus applicable to dividends, its infallibility was assumed. The contribution plan of dividends so universal in America was devised and applied to net valuations. The reserve which it created suggested at once a new analysis of the contract with a savings-bank fund, in a sense the property of the insured, and having as a necessary function a surrender value to which he was assumed to be rightfully entitled. Along these lines, too, legislation followed, and courts at times lent a partial judicial sanction to the idea. Endowments, limited premium, and other complicated policy forms were largely taking the place of the simple life and term insurance of an earlier date. Competition intensified as the business grew in public favor, and the companies themselves naturally fell into line and adopted the net valuation principle as a basis for popularizing and liberalizing their contracts. Thus the germ implanted for a purely governmental purpose expanded into a giant growth under whose shadow later life insurance in America was developed.

But it must not be supposed that American actuaries were blind to its necessary limitations or unanimous in its favor. Nearly thirty years ago Mr. McClintock contrasted the status of a policyholder taking out a $5,000 policy at the age of fifteen and ten years later another precisely similar in the same office for the same premium. (Our tabular premiums in America usually begin at age 25.) A third company at the end of a year would reinsure each on the same terms. But under a net valuation the company would be bankrupt with less than $257 reserve against the first policy. It would be perfectly solvent with $30 against the last. Mr. McClintock adds, in reference to the abuse of its application: "Away with a system so inconsistent, so dangerous, so utterly stupid." The net valuation was not prescribed by all the States. A gross valuation was even applied in New York to determine an issue of solvency, but practically it was generally adopted. It did good work in the line originally intended. But as time has gone on and interest has fallen, and the race for business has become sharper, and struggling companies have been forced to the wall, and the organization of new companies has been prevented, and the accumulations of older policies have been called on to meet the increased cost of new business, the limitations if not the inconsistency of the net valuation method have been pressed home to our American experts.

Discussion.

With these preliminary remarks I shall proceed to discuss those limitations. There are certain postulates which may be laid down at the start. First: A net valuation can never by itself be a complete test of solvency. Commercially and legally the term insolvency has several meanings which are often confounded. It is sometimes used in the sense of simple bankruptcy or inability to respond to present obligations, sometimes to signify an ultimate inability to respond to accruing obligations, and sometimes to cover both. No system of computing liabilities which ignores future resources, whether applied to a bank, a merchant, or an insurance company, can by itself be a test of ultimate solvency. I do not imagine any American actuary would dispute this proposition.

In the qualitative analysis of the chemist, however, the reactions of several agents are sometimes needed to determine the character of his compound. In the same way the reaction of a net valuation may often be needed along with other methods to determine the quality of a company's solvency. In this sense only can it be a test.

Second. A net valuation can never by itself regardless of other considerations determine the surplus which a company may divide. This is a corollary of the first. A process whose resultant will not even determine the question of solvency, cannot go farther and of itself fix the divisible surplus.

Third. A net valuation cannot by itself establish the equities of the members either as a body or as individuals. Unless we deny that the expense of new business should exceed the expense of renewals, or that a retiring member should protect the interests of those who persist, or that a company has a right to trench on the first year's reserve in the purchase of business, or affirm that neither health nor the future premiums to be paid affect the question of reinsurance, it is obvious that a net valuation cannot be a complete measure of equity either aggregate or individual.

Fourth. A net valuation cannot by itself correctly measure the comparative strength or the sound business management of the companies. This, too, is a corollary of our first proposition. If it cannot determine solvency, much less can it measure strength. If a new office cannot do business on the same scale of expenditure as an old one, if office premiums may differ, then, too, is it plain

that neither strength nor management can be gauged simply by this test.

Yet for all these purposes a net valuation may be an important aid, and with proper limitations may be a useful check against either excessive expenditures and dividends, or future insolvency. Its forte is just what Mr. Homans declared, as a means of determining that the fundamental conditions governing the business have been faithfully observed.

I pass then to consider the nature of its limitations. It is well to remember that in all questions relating to the insurance contract the court rather than the actuary is the ultimate arbiter. Both solvency and equity are in a last analysis what the court decrees, and I conceive that no complete discussion of the limits to a net valuation can wholly ignore its legal relations. In the sixteenth volume of the Institute of Actuaries Journal, Mr. A. H. Bailey, in an article on "Insolvency of Life Assurance Companies," notes the fact that when the principle of valuation was first discovered no difficulty was involved in its application. Only the office premium was known, and the accountant's simple rule that the present worth of the company's obligations must be met by the present worth of its future income, together with the funds in hand, was all that was needed. But when in 1815 Milne's work on Money Values, deduced from the Carlisle tables, gave a better knowledge of the actual cost and caused a reduction of premiums, the conception of a net premium loaded for expenses was introduced. Then arose a new school advocating a net valuation, to which was afterwards added a third by way of compromise, favoring the gross valuation with a proper expense allowance. Between the rival advocates of these three schools the battle has waged ever since. According to Mr. Bailey, a company is solvent whenever

$$C + a\,P = A + a\,E \quad (1)$$

in which C is the realized assets, $a\,P$ is the present worth of the office premiums, and $a\,E$ the present worth of the average expenses. De Morgan, writing earlier in 1838, gives substantially the same formula. Apart from the special case of negative values, this is unquestionably in its simplest form the true equation of ultimate theoretical solvency, and the one which doubtless first suggested itself to the mathematician. It may be properly termed the general equation of mathematical solvency.

Let us expand and analyze it in the light of our more modern

methods. Adopting the notation of the Institute of Actuaries, where φ is the loading and E the average expenses chargeable against an individual policy, we may write formula (1) as follows:

$$\Sigma\left[(P_x+\varphi_x)\,(1+a_{x+n})+{}_nV_x\right]=\Sigma\left[A_{x-n}+E(1+a_{x+n})\right]\ .\quad (2)$$

In this expanded shape we may see the chief defects in every ordinary valuation system.

First. Our formula is true only as to the aggregate summation. It is indeterminate when applied to the individual policy. With Σ removed it no longer necessarily holds good. This controlling fact is too often lost sight of under the operation of a mental law which leads us to attribute to the constituents the qualities of their compound, and to methods the qualities of their results. The fallacy has been at the bottom of a large share of our troubles in America. It has concealed one of the most important limitations of the net valuation system, by attributing to the individual policy all the essential qualities of an aggregate of insurance.

According to the kinetic theory of gases, each given temperature has its specific pressure, due to the aggregate bombardment of free molecules moving in space. But the movement of each individual molecule is wholly indeterminate. It moves until by chance it strikes a neighbor. The average of the whole determines the pressure. But that average tells us nothing of the range of a single molecule.

When applied to the individual policy, this formula is meaningless, except as a statement of our knowledge that with policies enough the equation would hold good of their sum. If we analyze the fundamental conception involved in all insurance, it is but a measure of our ignorance of the individual, combined with our knowledge of the group. The more we know the less we insure, and if our formula held good regarding the individual policy all insurance would be at an end. Unknowable as well as knowable events are controlled by law. Probabilities can be nothing but a measure of our partial ignorance.

In the face of these facts, so obvious to the student of probabilities, the principle involved in this formula has been largely emasculated in our practical treatment of the net reserve. It has been currently assumed, and the public in America has been taught by those high in authority to believe, that each individual reserve is held as a distinct trust fund for the policy-holder, for which he is entitled to an accounting. The fallacy has permeated our courts

and legislation in America. So far has it gone, that within the past year in Indiana an attempt was made to tax the life policy as a *chose in action* in the hands of the owner, whose value was the net reserve, and was only defeated by the refusal of the court to recognize such a property right in the absence of specific legislation.

It has been commonly treated as the basis of equitable withdrawals and apportionment of dividends. When so treated in the contract it becomes, of course, a legitimate part of the scheme, and is no longer open to the same criticisms as before, unless its application violates those fundamental principles of equity or stability, on which the scheme itself rests.

But my first point is that our formula leaves the sufficiency and the equities of the individual net reserve wholly indeterminate. Whatever claims may be made for it, these must arise from considerations *dehors* those fundamental principles on which the insurance scheme, as a whole, is founded. The same arguments would apply to any attempt to individualize a gross valuation.

Second. Passing to the first factor within the brackets, we meet the underlying principle in the limitations of the net valuation.

$P_{x+}\varphi_x$ is essential to the complete determination of the company's condition. Results obtained by the use of P_x only must be subordinate and partial. It can furnish only certain elements of the problem.

A net valuation, as a test of solvency or determinant of equities, must first assume the correctness of the equation

$$\Sigma\left[\varphi_x\left(1+a_{x+n}\right)\right]=\Sigma\left[E\left(1+a_{x+n}\right)\right] \quad (3)$$

As a matter of fact, φ is added not simply as an offset to E, but to provide against any deficiency which may arise in P_x as well. We load for contingencies of mortality as well as expenses. There is no fixed relationship between φ and E. Our formula, therefore, becomes indeterminate as before, when we attempt to separate the terms of our first factor. Every limited payment policy assumes that a factor V^1 must be added to the second member to establish the equality. If it were practicable to compute by the law of error a quantity R, such that

$$R=\left[\Sigma\left(\frac{d_{x+n+\frac{1}{2}}}{l_x}\left(P\frac{1-V^{n+1}}{1-V}-V^{n+\frac{1}{2}}\right)\right)\right]^{\frac{1}{2}}$$

where n is the possible after life of the insured taken between

nothing and the tabular limit, this quantity R would represent the theoretical risk of granting the insurance at premium P, and is a part of φ, which is properly a function of P. It is the theoretical cost to a third company insuring the sufficiency of P.

Here we meet a second important fallacy, which has fastened itself on the net-valuation method. No allowance under that method is made for R. Its existence is not recognized. P is treated as the entire portion of the premium applicable to the mortality element. It will be noted, too, that the risk of interest fluctuations and adverse selections, which are a part of φ applicable to P, are also left out of view. My point is that the ignoring of φ in any decisive test of solvency is false theoretically, even to the principle on which net valuations are supported. The only thing that can be done is to eliminate it by equating partial values when the special conditions of our problem permit, and this is what is in reality attempted in every application of the system. For practical purposes equation (3) is assumed to be approximately true, and we are left to deal only with known facts and tabular assumptions. The advantages of this plan are many and obvious. The practical superiority of the method for many purposes is due to them. Its limitations reduce themselves to a consideration of the cases in which equation (3) may, without serious error, be treated as true. This is the condition of an old and well-established company, whose even flow of retirants is steadily replaced by entrants at their original ages, under similar policies; whose membership is neither increasing nor decreasing; whose contracts call for equal annual premiums during their continuance; whose expenses are light and steady; whose interest and mortality are stable; which is under no constraint, either to strengthen or diminish its resources, and whose surplus is disposed of as it accumulates. Every departure from those lines adds to our error in the assumption of equality unless positive and negative errors balance.

I note, then, first the method is unfitted, as a reliable test of a young company, or even an old company, with rapidly expanding or contracting business. The paramount legal obligation of a company is to perpetuate its existence until its purposes have been accomplished. This legal obligation is an implied element of every contract. It justifies the retention of surplus when needed, even though equities may be disturbed. It exacts of a young company such expenditures of its resources for new business within the limits of safety as may be needed to secure a sound average, and requires

all companies within those same limits to maintain whatever membership is required to carry out their purposes.

This means that to exact a fund in hand of

$$\Sigma\,({}_{n}V_{x}) = \Sigma\left[A_{x+n} - P_{x}\,(1 + a_{x+n})\right]$$

may at times be a legal violation of the spirit both of the charter and the contract. Here we meet a fallacy very tenacious in America, and doubtless prevalent elsewhere, that because a company computes its premiums on a net basis, it is in equity, at least obligated to adhere to the assumptions made for purposes of computation. No such legal relations exist unless they are stipulated in the contract, or embodied in a statute or charter incorporated in it. The law knows nothing of net premiums, but only the stipulated payments in the policy itself. If questions of equity or solvency arise, a court will, like the actuary, use whatever methods seem best fitted to determine the facts. The relations of the parties are what the contract makes them, not what the ingenuity of the actuary may devise for computing them. A reference to the decisions of our American courts of last resort in the case of policies lapsed through our Civil War will make this clear.

I note again that equation (3) will not apply to companies whose contracts are largely paid in advance where we must write

$$\Sigma\left[\,(\varphi_{x}\ \text{etc.}) + {}_{n}V^{1}_{x}\right] = \Sigma\left[E,\ \text{etc.}\right]$$

V^{1}, which should be reserved for future expenses, is liable to be mistaken for divisible surplus.

Again, an uncertain future interest or mortuary rate disturbs the equality of equation (3), for here an indefinite function of o may be called on to contribute to the deficiency of either. Lapses and withdrawals are pregnant illustrations. It may be objected to this line of argument, that in practice our mortality, or interest rate, or both, are already loaded for fluctuations or contingencies in respect to the tabular assumptions; therefore, R is not a function of φ. I answer that, in America at least, this so-called loading is rather the fixing of a safe limit within which a normal experience, according to observed facts, may be expected to fall than an attempted provision against abnormal conditions. But, apart from this, I do not conceive that any company, in adding its loading, ignores the protection which, under the contract, it offers against the possible failure of tabular assumptions. Like the floater of the fire underwriter, it is intended to apply specifically wherever needed. If a

life company could be operated without expense of any kind, I imagine actuaries would agree that the office premium, however loaded, was the proper test of the company's condition.

Unless recognized by special stipulations in the contract or the charter, no charmed circle surrounds a net premium, setting it apart from the real office premium; the distinction is one of convenience and utility, rather than of necessity, and this is my point.

I now come to consider the limitations of a net-valuation method in the determination of divisible surplus and surrender values. Does it furnish an equitable basis for the individual policies? What is equity? Again we must refer to the law rather than the actuary. Equity may be consistent with any form of contract whatever, under which the members intelligently agree to enter on equal terms, in harmony with the legitimate purposes of insurance. The annuity, which profits the long-liver, is as equitable as the insurance which profits the short-liver, the mortuary bonus as the annual dividend. The unqualified lapse would be as equitable as the surrender value, if intelligently agreed to. Its inequity comes from the harshness of results that were not anticipated and understood. In other words, in order to define equity as applied to insurance, we must refer to the contract itself and its purpose. It cannot mean an equalization of payments. Inequality of contributions is the foundation of insurance. We mean by equity an apportionment of cost and benefit in harmony with our knowledge of the risk, and with the obligations assumed. The claims of the company, as a whole, are superior to those of the individual members, as before remarked. If found to be insolvent, every man's claim must yield to the equal rights of all. If overpayments are needed for the company's protection, or to properly carry out the object of its creation, their return may be forborne, or even dispensed with. Much has been claimed for net valuations as a correct measure of the equities of the members. But while it undertakes to apportion the cost to the risk, it takes limited note of the obligations assumed. The paramount obligation to protect the company requires that the series summed up, as S, be ample enough to maintain the law of average on which it rests, and to reduce E to a value consistent with the best interests of the members. (Of course, I am discussing companies where mutuality is a feature.) I conceive that excessive and unnecessary expenditures are as much a violation of the implied undertaking of a mutual company as an inequitable apportionment of dividends.

This paramount obligation also requires that this average relation shall not be destroyed by the reduction of φ or the increase of $\frac{d_{x+n}}{l_{x+n}}$ through withdrawals. No matter what special stipulations may be made regarding withdrawals, such stipulations are equitably unsound if they conflict with the implied obligations of the company to its members, as a whole, even though they be legally enforced. My point is, as before, that a net valuation can, of itself, determine equities only when, without serious error, E and φ can be eliminated from equation (2), and when $\frac{a}{l}$, on which the remaining factors depend, is not seriously disturbed.

Now, what are the limitations within which a net valuation renders efficient service and its real superiority exists? A brief examination of the deficiencies of the gross-valuation method will make these more patent. Reverting once more to equation (2), it consists of two classes of factors, the one tabular, the other arbitrary. A gross valuation, for reasons before stated, demonstrates the correctness or sufficiency of neither apart from the other. A deficiency of P or φ might be offset by an excess of the other, or by a deficiency of E. Our equation, moreover, only holds true on the assumption that deficiencies, in any of the terms, will be offset by an excess in others. We are dealing with a question of futures where the correctness and sufficiency of our constituent elements, as well as of our equation as a whole, are problematical, and are objects of inquiry. More than this, our contract is unilateral. It is compulsory on the part of the insurer, and voluntary on the part of the insured. The future income on which we count is not obligatory. Our assumptions in regard to it we are morally certain will not be realized. Lapses and withdrawals are sure to come; neither comply with any regular law. We know that none of our tabular or arbitrary assumptions will prove more than approximations to our actual facts. While it is mathematically true that, by compounding and multiplying our sources of error, we may measurably offset the one against the other, and so reduce our possible error as a function of the aggregate, it is none the less true that each individual error that can be eliminated helps to reduce the probable error of the whole, and every analysis of our equation, which enables us to eliminate errors in its constituents, insures more accurate and reliable results. A net valuation analyzes our equation of theoretical ultimate solvency, and enables us to more accurately determine the real values of our constituent factors.

The practical defects of the gross-valuation theory find an exaggerated illustration in what we know as assessment companies in America, companies in which stipulated premiums are either replaced or supplemented by power to assess. Theoretically, such companies can never be insolvent. Their aggregate future assessments can never be less than the sums insured. Practically, these companies become insolvent the moment their assessments reach a point where the desirable members, as a body, refuse to pay. Deficiency of ready cash in the treasury induces present bankruptcy and withdrawals of good lives render both the present value of the insurances and the expenses excessive, as compared with the possible income.

The investigation aimed at through a valuation of the company's resources and obligations is not confined to its ultimate theoretical outcome, but applies to every intermediate stage in the company's history, to temporary bankruptcy or embarrassment, to those results that are likely to arise through lapses and withdrawals, through fluctuations of mortality and through imprudent dividends and surrenders. The business of a life company combines the features of a bank and a trust company with those of an insurance office. We can no more properly ignore the banking or commercial element, and the conditions which they exact, than the distinctively insurance element. For all these reasons, that analysis which a net valuation provides, if not actually essential to sound management, is within proper limits a most important aid and guide. He would be a slovenly engineer, who, having computed the power and resistance of his machine, on theoretical assumptions, should ignore these in judging its workings because he had added a liberal safety coefficient. Negative values, however treated, are evidence that a gross valuation may need to be supplemented by such an analysis as will coördinate the results with the hypothetical assumptions on which our scheme was framed, which is another way of saying that the net valuation furnishes a needed means of finding out how far the fundamental conditions assumed have been realized. Knowing this, we are in better condition to gauge the future.

A net valuation tells us how closely our tabular assumptions have been realized. It coördinates P_x and A_{x+n} and φ_x and E, both as to the past and the future. It is thus in line with the recognized rules of scientific inductive inquiry. It gives us a function V derived from these tabular assumptions, which may be used

like the sailor's log line as a determinant, not of the true place of his ship, but of how she has been sailing, which must be corrected for leeway and currents and slip. Because only a time-sight can accurately place the ship, shall we discard the dead-reckoning and the log? If we know that the loading is abundant to care for incidentals and expenses, our net valuation can assure both present and prospective solvency. If the safety margin be narrowed, a net valuation by showing the drift in the past may tell us what demands may be looked for in the future. If new business is being purchased, or heavy outlays of any kind indulged, it is a beacon to mark the danger shoals. If the general wisdom or prudence of the management be in issue, it furnishes an important element that should be weighed. If the reliance that can be placed on our original assumptions, or the errors involved in them are to be fairly judged, we must have recourse to this mode of valuation. When we know what allowance should be made for the leeway and currents and slip, the practical advantages in its application are great.

I take first its application for governmental purposes. When confined to the object originally intended, which was simply a check on imprudent management, it sufficiently answered the purpose at the time in America. The rates were understood to be adequate, and the guaranty capital required by law to be sufficient to tide over the cost of new business. Evidence of faithful adherence to the fundamental conditions of the contract was what the Government sought, and this it furnished. What has grown out of this? To-day the officials of more than a score of States are occupied with the sworn returns of companies in the form of prescribed balance sheets for public information, in which the chief liability is represented as a prescribed net reserve, offset by cash assets in hand, and the difference is formulated as "divisible surplus above all liabilities" or "surplus as to policy-holders," or even brought down as a separate unbalanced item after the balance has been struck, lacking which under our laws a company is technically insolvent and must suspend new business. This statement is accepted by the public as a complete financial exhibit of the company's condition. Its strength, its standing and its progress, both of itself and in comparison with its competitors, are chiefly measured by the relation of these three elements—liabilities, capital, surplus. Every expert knows that the attempt to divide this surplus might bring the company under the ban of a State official when its capital is trenched on; that by reason of low rates or

paid-up policies it may not have a dollar to spare, or by reason of high rates or commuted commissions all and more may be dispensed with. But even experts cannot resist the contagious influence of popular opinion backed by authority. A useful guide for the departments has been turned into a Procrustean bed on which all must lie. Granting that we may assume without serious error the equality of P_x, etc., and A_{x+n} at every stage of the game, so that withdrawals would merely result in cancellations of these factors, from both sides of the equation, φ and E are not so related. The latter involves a constant expense that must be maintained while the company lasts; and if the cost of new business, too, be considered, it may represent the value of a decreasing annuity. So that even in theory the gross valuation becomes defective the moment these two elements are admitted. In practice this point receives greatly added emphasis from the influence of selection, which tends to render

$$P_x\ (1 + a_{x+n}) < A_{x+n}$$

The moment public confidence in a life office is impaired for any reason, as is well known, this threatened inequality becomes a menace to solvency; and formula (2) no longer represents the expected future. Impending financial weakness or embarrassment is the chief disturber of public confidence and the net valuation furnishes the best test of its approach. This, to my mind, is the great advantage of this method for governmental purposes when rightly employed. Industrial insurance is a business of commuted commissions and enormous initial lapses. The theory on which it proceeds is the replacement of these lapses at heavy initial cost until a solidified debit has been created. Years are required before this debit can repay the outlay. Our legislation in America takes no note of these facts, although the premiums have been correspondingly loaded. The company must put up each year a fictitious reserve which it cannot earn, which is contrary to the theory of the business, and which is provided against in the loading on its future premiums. The attempt to start a new company there is rendered almost suicidal under existing conditions. Several such have been forced to the wall. This is but an exaggeration of conditions which prevail whenever commissions are commuted or the necessary cost of new business exceeds the marginal provisions. A true theory of the business requires that the company should borrow from the future if needed to maintain its

membership. This theory should be recognized in the net valuation. The company advances in part for the entrant the cost of procuring him. It may be proper when dealing with individual policies, but it is not necessary to assume that the company must be protected by an excess of premium equal to the current cost of insurance. In industrial insurance no such limitation is or can be imposed. The cost of a solidified debit in America is popularly reckoned at a hundred times or two years' purchase. The theory is that the profit from the policies in mass will in the end repay the outlay. I know no reason why the doctrine should be inapplicable to ordinary insurance so long as the individual policyholder does not himself profit by the lapse. This suggests an extension of the plans proposed by Dr. Sprague and Mr. Homans at the last meeting of this society for allowing for the expenses of new business. Mr. Homans suggested that the usual method of net valuation be applied only after the first year. According to Mr. Homans the logical reserve at the end of the first year, which should be treated as the real reserve would be, accenting the terms where experience is substituted for theoretical assumptions, and making K the sum to be deducted for expenses.

$$\frac{l_x}{l^1_{x+1}}(P_x - K)\ (1+i) - \frac{d^1_x}{l^1_{x+1}} = {}_1V^1_x$$

V^1 might in this case be negative and would be dropped for the first year, but would reappear in the second as a substitute for K in computing ${}_2V^1_x$

If such a modification of the net-valuation method could be employed, and the American balance sheet could be reformulated to eliminate the fictitious importance now attached to the net reserve, I fail to see why for ordinary governmental purposes it would not continue to be the best as it is the simplest and most commercial method of valuation. But I presuppose that any official judgment predicated on its results would be supplemented when needed by other tests, and that our laws should no longer seem to make it a complete test of solvency, and say in effect of a company unable to comply, that it is sick and likely to die.

The necessary limits of my article prohibit more than a brief discussion of the question which is, after all, of the greatest interest in this connection, namely, the real relations of the net valuation to the equities of the individual members. As has been said, it cannot of itself fix these equities. But when a court seeks to deter-

mine equities, chief among its inquiries are the processes employed in establishing the relations of the parties. There is a strong presumption in favor of these processes. When the goods of the manufacturer are burned, the cost of the raw materials and the labor expended in transforming them into the finished product become pertinent subjects of inquiry, and in the absence of a definite market price may afford the best measure of their value. There is no market price for life-insurance equities. The theory on which the cost of insurance is determined is in universal use. There is no other well-defined function which replaces the net premium as a general basis from which to measure equities. There is no other function which deals so directly with the original assumptions of the business. There is none to which a court would so naturally turn in a contract whose character forbids the application of ordinary commercial rules. There is no other function which analyzes so thoroughly the ordinary business features of the contract. The reserve which it furnishes differentiates in a measure the banking elements of the business. However mixed with error, there is for important purposes a certain measure of truth in our popular American conception of the net reserve as the banking feature of insurance. American fire underwriters are accustomed to use what they call a standard risk with an established value. They fix their rates according to deviations from this standard measure. In a somewhat similar way a net valuation furnishes a natural standard to which to apply the deviations which equity may require. A bank or mercantile corporation has a fixed commercial rule for determining equities. Not so the life company. No two actuaries are likely to agree on the equitable interests of the policy-holders nor on the rules which should be applied under different conditions. No two courts are likely to agree. The complicated elements involved take the question out of the range of pure mathematics, and resolve it into a matter of judgment for the actuary or the court. But business necessities demand fixed rules which shall be of general application, and remove the question beyond the reach of mere caprice. The net valuation furnishes a natural foundation for fixed rules of general application. We must have a definite starting point in every scientific mensuration. We should have as a starting point a function most nearly corresponding with our object in view. The value of the metric system is in the coördination of all its parts starting from a measured arc. The abuse of the net-valuation method has come from ignoring other elements and making it the rule rather than the foundation.

Governmental attempts to prescribe equities must always be an abuse of power and an act of harsh injustice, unless the law is content with simply establishing a foundation rather than a rule, a minimum limit with which any properly managed company can comply, and this governmental limit competition in America has rendered superfluous.

No two companies are alike in their conditions, nor are the conditions of the same company alike at all times. Apart from fixed contract rights the equitable relations of the members are an unstable quantity. The equitable relations of the retirant to his fellow members are one thing in a prosperous company; they may be quite another in a company where every withdrawal reduces the average vitality of those that remain. The hypothetical premium plan of valuation emphasizes the rights of the individual retirant by exhibiting the reinsurance value of his policy. An ordinary net premium valuation with allowance for initial cost of insurance and the contributing value of his policy to the general claims and expenses, may emphasize the rights of his fellow members against the retirant. Limited payment contracts may produce a wholly fictitious reserve under the application of the same net method, whose results are entirely consistent when applied to continued premium contracts. In America every form of policy which actuarial ingenuity can devise is competing for popularity. No general laws can formulate the equities of such a business, however ingenious the lawmaker. As well might we undertake to prescribe by statute the law which applies to every issue brought before our courts, and relieve our judges of their functions. In America, as well as Great Britain, the common law is the foundation of our jurisprudence. Its strength is its flexibility and power of adaptation to each individual case unhampered by rigid enactments. It is efficient because it is a growth, built up of individual cases correlated into general principles. As every lawyer knows, no machine-made code could fill its place. Such an attempted substitution would subvert justice. In the same way no scheme of legislation, however able, can supplant the functions of the actuary as the administrator of justice among the members of his own company, under that common law of insurance which is an outgrowth of its fundamental principles. The attempt to accomplish this through the net-valuation system is, in the minds of many American actuaries, the most serious defect of our governmental system.

Here I must close my discussion. The topic is too large for a consideration of more than a few of its more prominent phases. I have sought to show that the true limitation of the net-valuation system consists in its application to determine how far the fundamental conditions governing the business have been carried out. When this is known it remains for the expert to apply the knowledge in the determination of questions involving solvency or equity according to the special case in hand. There is no necessary conflict between the gross and the net valuation systems. Each has its legitimate use and each may be abused. But when his valuation is complete the actuary may still find himself only on the threshold of his inquiry regarding the true condition of his company. In its final analysis every business venture resolves itself into a question of mathematical probabilities, but with so much of the data and the formulas unknown or complicated that its solution as a mere mathematical proposition is impossible. We must supplement our mathematics with practical judgment born of experience. Life insurance is no exception. It differs from ordinary business chiefly because the scope of the mathematician is broader. It has long been an accepted principle in Great Britain that the true standing of a company can only be judged by a comparison of the various features of its returns. American actuaries recognize the same truth.

If I am right in these conclusions then all who contend for any form of valuation to the necessary exclusion of others are wrong. Each form has its special use in which it may be superior to the rest, but the fundamental form to which all others are subservient is that form of gross valuation which alone can determine the question of theoretical ultimate solvency. The practical mathematics of life insurance can never be wholly divorced from its business features, nor the questions which arise in it be dealt with on purely mathematical theories. The engineer must compute his stresses and resistances by mechanical formulas, but when all is done his coefficients of friction and safety must be matters of judgment. So it is in insurance.

Here I rest, purposely stopping short of those detailed practical applications which, I believe, were in the mind of Mr. Homans. My topic was originally his, and my treatment of it has been inspired rather by a wish to honor his memory than to seem to usurp his place.

Provision for and Distribution of Expenses.

WILLIAM D. WHITING.

THE more difficult problems of a science or art are naturally the last to be solved. The relations of interest and mortality to life insurance are comparatively simple factors, and well developed. But when we descend from the exact reasoning of these more exclusively mathematical subjects to the division of expenses, we encounter a confusion which makes it difficult to select and arrange a sufficient amount of controlling data for a basis upon which to erect a symmetrical structure for practical operations.

Too generally, when attempts have been made to construct a scheme for distributing expenses, the actual conditions imposed by competition and experience have been ignored with a vague hope that theoretical considerations might in some degree be made to govern custom. Or they have been restricted to too few elements of expense in an endeavor to minimize the labor of computations. While both of these considerations are entitled to recognition, they should not be allowed to handicap the search for a solution, by substituting deductions for inductions. At the bottom of the subject must be laid a fundamental classification of expenses themselves, derived from companies' financial statements.

It will aid us to summarize the discussions which have appeared. The original net premium seems to have been loaded by a constant percentage of itself to meet expenses and general contingencies. The latter, because the rates of interest and mortality were considered more liable to fluctuation than are now feared by well-regulated companies. At present the assumed (three per cent) rate of interest is theoretically fixed low enough to cover the expenses and losses due to investments, and the assumed rate of mortality high enough to cover all contingencies due to the probability of dying, thus leaving the loading on premiums and discontinuance gains free to cover all other expenses without specification.

At one time the ingenious theory was brought forward by able men that these residual expenses should be apportioned according to "the value of the insurance to the policy-holder." Their conception of this "value" took the form of costs of insurance

$(S-T_{x+1})q_x$, either annually or discounted into what they called "insurance values" or "present value of future normal costs of insurance." Although this theory became crystallized in the statutes of several States, it was rejected by the great body of actuaries and companies when it became apparent that expense disbursements in insurance, as in all other kinds of business, are arbitrary and have no relation to the value of the goods; or worse yet, even constitute a part of that value instead of being a function. The value of an insurance consisting not alone of the technical "costs of insurance," but this, plus the cost of getting some one to furnish and guarantee it who declines being restricted by any such formula. The theory was also cumbersome to compute and handle, notwithstanding its single theme.

Finally a valuable suggestion came from Great Britain to the effect that, as the gross premium was irrevocably confined by competition to a uniform amount for each policy year, while the expenses of the first year from the same cause were irrevocably much greater than for any of its successors, the first year should be treated as term insurance, so as to obtain a larger loading therein by releasing it from the obligation of accumulating any reserve. Modifications of this idea have appeared by attaching liens to the policy equal to the first year's terminal reserve as additional first year's premium, leaving the character of the insurance undisturbed.

Although much has been written and said on the subject of providing for and assessing expenses, but little progress has been made, and it remains in so unsatisfactory a condition that an attempt, by another method, to contribute to its solution should be tried. I apprehend that a scrutiny of companies' statements will disclose five distinct kinds of expenses, which are independent and cannot be greatly modified, to wit:

1. New Business: consisting of examination fees, agents' first year commissions, and advertising, printing, salaries, etc., incurred in getting new business; say, eighty per cent of first year's premiums.
2. Collection: consisting of agents' renewal commissions, collection fees, exchange, taxes on premiums, etc.; say, ten per cent on renewal premiums.
3. Settlement: consisting of the expense of investigating and resisting death-claims; say, 1½ per cent of face of death-claims.
4. Investments: cost of making, handling and protecting same,

bad debts, losses over gains, taxes and repairs on assets; say, one-half of one per cent per annum.

5. General: all other expenses, particularly those of general supervision, actuarial and clerical; say, $1.00 per $1,000 of insurance annually.

How shall we provide for these necessary and independent expenses so as to charge them equitably upon each class of policies in proportion as they cause them, maintain consistency in computing reserves, surrender values and dividends, and yet make no serious departure from present level office rates, without so complicating our processes as to render them unworkable?

The first expense item—for New Business—should be met during the first year by each class of new entrants for themselves, so as to avoid a loss to persistent members being occasioned by the lapsing or death of one in arrears. The old members have built up the company at considerable cost to themselves and own it. It is unjust that new members should be allowed to participate in the benefits of an established plant without at least paying their own cost of entrance. It would be more proper, indeed, they should be charged a bonus for the privilege of entering, to go to the old members in reimbursement of their early excess of expenses in establishing the institution. Old members should not need the new under a proper arrangement for future expenses; and any scheme which is not mathematically self-sustaining, until the last risk is disposed of, and requires "new blood" to support it, is insolvent by confession.

It is true that the old members, left to themselves, will gradually diminish in numbers and a certain class of expenses will proportionately increase thereby. Some arrangement among themselves must be made for this, and will be treated of later under item 5 of General Expenses. The present contention is that each body of policyholders must be wholly self-sustaining, as to mortality interest and expenses, in order to work out a solvent scheme; and the fallacy of "new blood," which has been the excuse for so much extravagance and inequity, should be utterly abandoned. But how can the new entrant be made to pay the expenses incurred on his account during the first year, within that year? Ruling out the possibility of returning to the small initial expenses of twenty-five years ago, or of exacting a sufficient cash initiation fee, two methods are proposed:

First, subject the insurance to an interest-bearing note or lien

equal to the extraordinary expenses of the first year, but not exceeding the terminal reserve of that year. The effect of this is the same as an initiation fee, not subject to agents' commissions. But it works awkwardly in so far as the sum payable as a claim is diminished by the lien if not canceled by dividends; and the interest continues payable annually after "limited premiums" have ceased. To avoid this it has been suggested that the lien be converted into an annuity in favor of the company, for the same term that the premiums run; and be counted as a diminishing asset or lien against surrender values. Neither of these forms, although mathematically sound, would be apt to be well received by Insurance Departments; and the notes or annuity liens (besides imposing considerable clerical labor) would run the risk of being disallowed as assets, notwithstanding being made so by the expressed terms of the contract.

Second, make the first year's insurance a preliminary one-year term risk, the permanent insurance to commence one year after the date of the policy at the premium rate for the then increased age. This method has come spontaneously into use on both sides of the Atlantic within a few years, on account of the necessities of the younger companies under the pressure of competition, and has proved successful with agents. It has the recommendation of high actuarial authorities, and no refusal to recognize it has yet appeared from State officials where the terms of the contract were stated so that the policy-holder could know the exact character of the insurance he was purchasing. This method of releasing the first year's premium from the obligation of a terminal reserve allows it to be wholly employed in meeting the heavy expenses and light mortality of this period, which should be confined strictly within this limit. This method works least advantageously on short, limited payment plans, as the permanent premium is not only based upon one year of age higher than entry, but the number of limited payments is lessened by one year.

With the new business made self-sustaining in its first year, the renewal premiums need only be burdened (item 2) with the expenses of their collection and renewal commissions to agents. This, with an allowance for taxes on premiums and occasional loss by misappropriation, is easily covered by an average loading of ten per cent added to the net premiums, which in the proposed distribution of expenses constitutes the only loading imposed upon the net premium. This readily permits the use of three per cent as

a basis for computing net premiums without exceeding materially the office rates now in use, except in the case of short limited payments as before mentioned.

The third item (Settlement) of expense only occurs upon death-claims, and a ready method for its provision may also be employed to correct a glaring defect in our present practice. Our computations of net premiums and reserves are made upon the incorrect assumption that death occurs at the end of the policy year, whereas claims are actually paid, on an average, about the seventh month and five months' interest on the face of the claim is lost to the company. This should be altered and death assumed to take place at the beginning of the policy year immediately after the premium is due. We would thus gain seven months' interest—about $17.50 per $1,000 of claim—which would easily cover the expenses of investigation, litigation and settlement in question. In order to accomplish this the commutation column C would become $v^r d_x$, instead of $v^{r+1} d_x$, as at present. The result would be an increase in all premiums and reserves, except Endowments, of just three per cent when the basis of three per cent interest is employed. On Endowments the increase would be only three per cent of the term insurance portion thereof.

The fourth item of expenses exclusively concerns the care and investment of assets, including incidental losses and taxes and repairs on real estate. A small amount should be included for the time and expenses of officers and clerks employed in this branch of the business. This item is easily and naturally provided for out of the gross interest and rents earned on total assets, by assuming a lower rate of interest for computing net premiums and reserves. Thus, if 3½ per cent is the maximum gross rate which can be safely relied upon during a period of, say, thirty years to come, the net rate employed would be about three per cent, leaving a margin of one-half per cent to cover the various expenses included under item 4. There is a general agreement among actuaries concerning the propriety of this arrangement.

The residual item (5) is for general expenses which run with the entire duration of the policy. For this reason it cannot be loaded upon the premium (as was item 2) without establishing a new and burdensome side computation for future general expense reserves; as the premiums on a considerable portion of business stop short of the term of the insurance, and as this general expense (referred to in discussing new business, item 1) should *increase*

somewhat as the original number of policies of its class diminish by *maturity*. That portion of diminution which is occasioned by lapsing should be offset by a surrender charge, and will be discussed later. Neither can item 5 be levied against the interest earnings of the reserve (as was item 4) because short-term insurance only has a nominal and erratic reserve, while reserves generally vary widely with the kind of insurance and usually increase rapidly.

We must therefore search for some basis which runs with the term of insurance increasing slightly, and yet may be easily handled as a measure for these small general expenses. The annual cost of insurance $(S—T_{x+1})q_x$, offers such a basis, and has been warmly advocated for a much larger rôle in the distribution of expenses on account of its supposed equity, as already mentioned. By adding about ten per cent to a true q_x we would derive an additional annual cost of insurance, slightly increasing, but averaging about $1.00 per $1,000 of insurance. Experience shows that this ten per cent is just about the difference between actual mortality and that expected under the Combined Experience (17 office) tables generally used in the United States, excluding first year's mortality. In other words, the mortality tables now in use may be considered to be equal to actual experience already loaded ten per cent, so as to provide the extra "cost of insurance" necessary to meet these general expenses of item 5. Here, again, there is no occasion for alteration of present custom.

Thus, starting from practical conditions, a simple, consistent and equitable theory for the provision and distribution of expenses as they actually exist, may be constructed, which will permit a company to go to a three per cent basis for reserves and net premiums, without material alteration in present office rates, and which adds nothing to the ordinary labor of computations. It remains to trace its effect upon

Surrender Values.

These are based on the net reserves accumulated on lapsed insurance, less a surrender charge or deduction retained for the option of withdrawal. This deduction is theoretically exacted as a set-off to the damage sustained by persisting members, and is of a double nature. First, by reason of the increased mortality cost to those who remain, and second, their increased general expenses (item

5) occasioned by diminution of their number from lapses, not otherwise provided for.

Both of these forms of damage are functions of "cost of insurance," and *temporary* in effect. The self-selection of the retirant is like the medical selection by the company of entrants, only milder in degree, and soon disappears, producing its greatest effect in the first year. The same is true concerning increased ratio of general expenses. The company cannot immediately cut down such expenses to accommodate its reduced membership, as many engagements are made for a year, although in time it will do so approximately. It would therefore seem that some ratio or multiple of the "cost of insurance" rather than of the "insurance value" would be a fair measure of the penalty for withdrawal.

It has become customary, however, to make a much larger deduction than this and to ignore all rights of the retirants in undivided surplus. All such excess over the real damage must be counted as arbitrary net profit to persisting policy-holders, and distributable among them proportionally to what each of them would have lost in case he had been a retirant. Perhaps the nearest practical approximation to this would be as a percentage of his reserve and surplus, which would bring it into the same category with interest receipts.

In this connection two matters are to be noted. That if a company keeps on hand a sum of undivided surplus equal to what would be an equitable surrender charge on its whole membership, as many do, the equitable surrender value would be exactly the reserve of lapsing members, and no penalty should be levied beyond the forfeiture of interest in such surplus. In that event, however, all policies discontinuing by death or maturity would be entitled to their share of undivided surplus. It would not do, however, to guarantee full reserve surrender values, as such surplus is an uncertain quantity, subject to violent reduction in times of financial depression, when surrenders are mostly in demand. Second, the doctrine supporting surrender charges is incompatible with the practice of charging old members with any cost of getting new ones, as in such case the old retiring member will already have paid the cost of getting one or more substitutes by way of diminished

Dividends.

The "Contribution Plan" of dividing profits, theoretically adopted by all American companies, is mathematically unim-

peachable. But its use has been seriously impaired by lack of an accurate method for ascertaining the true amount of profits and the equitable distribution of expenses. We have arrived at the former by reason of the Gain and Loss exhibit required by the present form of annual statements to insurance departments. The foregoing method of distributing expenses fits readily into the scheme of the "Contribution Plan," as each item of expense, necessary to be considered, comes naturally as a deduction out of some item of gain already recognized in practice.

For instance, item 1, for new business expenses, would, with first year's death-claims, come out of first year's (term) gross premiums, leaving, perhaps, a small surplus belonging wholly to first year's policies. Item 2, for collection expenses, should come out of renewal premium margins or loading, leaving a surplus divisible as a percentage on gross renewal premiums. Items 3 and 4, for investigation of death-claims and caring for investments, would come out of interest or investment surplus earnings, leaving a balance divisible as a percentage of reserves. The remaining item (5, of general expenses) should be deducted from mortality gains, other than those of the first year, as it was provided for by loading the mortality table. The residue of mortality gains is divisible among renewal policies as a percentage of their year's cost of insurance.

The gains from lapse and surrender should be added, so far as the actual damage is concerned, to mortality gains; and so far as excessive surrender charge over damage is concerned, to interest gains.

Of course, in practice, some of these nicer points would be negligible, especially when the net gain is inconsiderable. But because of these customary "short cuts" and condensations, which are not intended to be discouraged herein, it does not follow that a correct working theory should not be sought and recognized as a logical basis from which to derive our approximations for actual work, especially when such theory shows, in the main, that our every-day practice is, after all, well nigh mathematically correct, and calls for but little alteration.

The Ideal Life Insurance Company.

JOHN M. HOLCOMBE.

LIFE insurance performs for civilization a service which can be supplied by no other agency. It repairs the pecuniary loss occasioned by the extinction of a productive life, or it provides a sure income for the support of that one who lives beyond the average lifetime of his contemporaries. Incidentally it encourages thrift and furnishes a medium for the accumulation of savings.

Like other institutions, it is the outgrowth of a definite demand, and experience and competition have tended to eliminate harshness and injustice, and have brought it, step by step, toward the goal of perfection, until we can discern the chief features of that company which shall do such exact justice as to supersede the requirements of legislation by its own virtues.

What is it the loss of which is repaired by life insurance?

It is the present value of future effort. The amounts of the anticipated earnings of a human life must be estimated, to be sure, but while they will be subject to unforeseen fluctuations, they are liable to no more uncertainties than other property which may be increased or diminished by occurrences impossible to be foretold. The length of time during which these labors will be exerted must be determined by a study of the rate of mortality under different conditions. Every life which produces more than is needed for its own requirements has a value to some one, and it will be the province of our institution to make good the loss which will be inflicted by its premature termination.

A mortality table, based on the experience among select lives, will be the basis for calculating the premiums to be paid by those who come within that class. But the careful observations of skilled specialists will make it safe to extend the benefits of life insurance to all who may need its protection. There will, therefore, be many rates for each age, but equity will be maintained more completely than in those times when each applicant was measured by a Procrustean rule.

Inasmuch as many policies will run into the distant future, it will be necessary to fix an arbitrary rate of interest, which shall be used in calculating premiums and reserves, and which will be so low as to render it certain that the returns to be received on safe investments will not fall below it.

The intelligent and discriminating care which will be exercised in accepting and rating the applicant will be such that the conditions of the payment of the policy at maturity will be of the simplest character.

Each policy, which by its provisions requires an accumulation, will contain a stipulation for a value upon surrender, which will be the least amount which should equitably be granted, but as the physical condition of the insured may be an important element in the worth of his policy, an examination may be submitted and accepted as an element in proof of the real sum which should be paid. Values and loans will be freely granted on the assumption that a member can judge and decide for himself what he needs as intelligently as he did when he paid his first premium.

The assumed mortality table being high enough to cover any variations, and the interest assumption being sufficiently low for all possible fluctuations and investment losses, there will be need of but little surplus, and apportionments of earnings will be made frequently. The desirability of uniform allotments and, consequently, steady payments of premiums being evident, there may be some irregularity of surplus, but the general plan of a distribution of all earnings will be the governing principle.

The whole object of this company will be to supply for an equitable price, protection against the loss of legitimate labor, and not to furnish a means of investment or speculation.

These are some of the parts which will go to make up the life insurance company which will continue to do business after the arrival of the millennium. But while several of the suggestions made deserve consideration, it seems to me that it would be useful for this Society to discuss more fully the question of the safety and wisdom not only of rating applicants who are now generally accepted more carefully than is now the custom, but also of extending the benefits of life insurance to many who are now debarred from its protection.

In the experience of every company, probably, there is a pretty wide distance between the unquestionable risk on whom a policy for the full limit on the lowest premium plan is readily granted, and the applicant who is limited to a small policy on the highest premium plan. This is not strict equity; it may be reluctance to reject a useful member, it may be a concession to an agent, it may be in the nature of a "flyer," but it is, nevertheless, taking money, not much, perhaps, but yet some, from the pocket of one member

and putting it into that of another. It may be that a risk may be first-class for a short endowment, and second-class for an ordinary life, but there are many which are forced into the select class who do not belong in that category, and who should pay their fair share of the mortality.

But are there not other classes who are not now accepted even by companies who frankly do an under average business, who can safely be insured on some terms?

If a man earns $1,000 a year more than the cost of his own subsistence, and an intelligent consideration of his condition renders it probable that he will live a year, plainly an advance premium can be fixed. It may be too little or too much, but every other man who is insured on any terms will pay either more or less than is necessary to meet his policy at maturity. It is all a question of discriminating rating. Family histories, personal records, present conditions, habits, occupations, either alone or in combinations, are the elements in every case. The Medical Referee of to-day seeks to decline all applicants who will not, in his judgment, live out the expectation table, or to advise the issue of short-term policies whose duration will be less than the terms of life. The agent is indignant, oftentimes justly, at decisions which he believes to be narrow and harsh and inconsistent with former actions, and he feels that he has lost the reward of his labor and the company a desirable member, and his customer has been deprived without good reason of the benefits of insurance. The money which is spent on declined risks would pay many a loss.

In the office of the life insurance company of the year of our Lord 1898 sits a man who entreats and demands, by offers of rewards and threats of punishment, that his agent shall write at least a given amount of business. The agent sends the results of his labors to another man who sits in another part of this office, and who is expected to equalize, in some mysterious way, things which cannot be made equal.

In the office of the ideal life insurance company will sit a man who will urge his agent to faithfully depict to every one the benefits conferred upon mankind by his institution, and to send in the unvarnished story of his life and of his needs. The man who sits in another part of this office will carefully weigh the circumstances placed before him, and report to the actuary opinions which will render it easy to fix a proper premium for each risk incurred.

Select Life Tables as the Basis of Premium Rates.

THOMAS BRADSHAW.

IT has been recognized in Great Britain that Select Life Tables are more appropriate for the calculation of office premiums than the ordinary Mixed Life Tables, inasmuch as they afford a more accurate measure of the risk premiums than the aggregate tables; consequently, Select Life Tables have been very generally employed by British life insurance companies for that purpose.

While it has only been of recent years that practical use has been made of Select Life Tables, the profession has taken a lively interest in the subject of selection for a considerable period, and it was thought that a short review of some of the important investigations made, together with a comparison of the net premium rates according to a Select Table and an Aggregate Table, would prove of some interest.

So far back as 1834, Mr. A. Morgan, in the Equitable (Brit.) Mortality Experience said (J. I. A., XX.—I.): "In a body of lives of the same age, all selected as healthy from the general mass of mankind, it is obvious that the rate of mortality must be considerably less for the first ten or twenty years after selection than amongst those from whom they are thus chosen. As, however, these selected lives advance in age, their general health and the rate of mortality amongst them will naturally approximate to the common standard." Mr. Morgan pointed out and illustrated, by comparing specimen rates of mortality taken from all classes collectively with those of separate classes, the effect of selection. He also calculated six values of the expectation of life based on select lives.

About ten years later, Mr. Wm. Spens utilized the material furnished by the Equitable Society in connection with the Seventeen Offices' Experience, to obtain the values of annuities on select lives. The lives admitted in ten-year groups were kept separate, but owing, it is presumed, to the paucity in numbers, the entrants in advanced years, in each ten-year group, were mixed with those

who had entered earlier in life, and who had been insured some years previously. While the values of annuities obtained by Mr. Spens allowed for selection in part, the material employed and the somewhat arbitrary manner of dealing with it could not but yield very approximate values.

The Equitable Experience was again treated in 1850 by Mr. J. A. Higham (J. I. A., XX.—I.) for the purpose of endeavoring to trace the effect that selection had upon premiums for insurance. He calculated the values of annuities for every fifth year of age from 20 to 65 by first "determining the probability of life from the data supplied by persons who entered the Equitable Society at the age under observation, and at the ages one year younger and one year older. For instance, the value of an annuity on a life selected at the age of 40 is calculated from the experience of the Society in respect of persons who entered at the ages of 39, 40 and 41." Mr. Higham pointed out, when comparing the premiums calculated on the basis of a Mixed Table and those calculated on Select Tables, that the young lives were favored at the expense of the old ones. "A young man's chance of life is exaggerated in the tables by the adventitious circumstances that an infusion of new blood takes place at every stage for the greater part of the future lifetime through which he is supposed to pass. On the other hand, a man insuring at a mature period of life finds his expectation underrated by his being classed with the mixed body who have lived over from the earlier ages."

Mr. J. A. Higham, in 1851 (J. I. A., I., 179), made an important investigation, based on the experience of the Seventeen Offices, to ascertain for what period selection has an appreciable effect on the rate of mortality. This time he combined the entrants in five-year groups, according to age at time of insurance; thus, under the age of 40, he included all those who entered at 38, 39, 40, 41 and 42. The well-known, easy of application, but rather arbitrary rule arrived at was that selection approximately exercised an influence during the period represented by one-half the difference between the age of 80 and the age of entry. After the age of 70, Mr. Higham assumed that the period of selection was the same as at that age, viz., five years. It is interesting to note that inasmuch as the Seventeen Offices' Experience had been formed upon the basis of calendar years, the adjustment made by Mr. Higham to obtain the probability of surviving the year immediately after selection, or the first policy year, was to take the average of the probability of surviving

to the end of the calendar year of entry and the first entire calendar year after entry according to the three tables—Seventeen Offices, Equitable Society and Amicable Society. This method could not but make the value of p_x smaller than it should really be. Mr. Higham also dealt with lives amongst whom the effect of selection had been exhausted. He constructed a table from which was ascertained the mortality prevailing amongst such lives, and joined on to it his Select Tables of Mortality, at varying periods for the different ages of entry. This ingenious method was followed with good results by Doctor Sprague in his Select Life Tables.

About eleven years later, Mr. Wm. Spens (J. I. A., X., 61) in treating the Scottish Amicable Mortality Experience, 1826–60, calculated values of select annuities. He assumed that the effect of selection ceased six years after entry, and, like Mr. Higham, adopted an ultimate rate of mortality without regard to duration. The rate of mortality for the first six years was obtained from averaging the rates of the Equitable Society, Seventeen Offices, Town Males and Scottish Amicable. He carefully examined previous mortality experiences to trace what effect selection had upon the ordinary rate of mortality, and the period during which its force generally spent itself. He assumed that the rate per cent. of mortality for the first year was the same for all ages from 22 to 42, viz., .45. That for older ages appears to have been determined arbitrarily. A smooth juncture having been made, after the period of selection had passed away, with the English Life Table No. 2 (a comparison of actual and expected deaths having indicated that the ultimate mortality resembled very closely that of the English Life Table No. 2), that table was adopted as exhibiting the ultimate rate of mortality. Mr. Spens dealt with the material in a somewhat arbitrary manner. Quinquennial grouping was adopted and results first obtained for the central ages at time of insurance, 22, 27, 32, 37, ... 57, and function q_x obtained from them. The intervening values were obtained by interpolation. The adoption of the English Life Table No. 2, which is not an experience of assured lives, and the somewhat rigid manner in which he determined the rate of mortality during the period which selection was presumed to exercise itself mostly, to a large extent rendered Mr. Spens' results unsatisfactory for life insurance purposes.

In 1869 the Institute of Actuaries published the material upon which it subsequently based its well-known tables, and the subject of selection received a great impetus from that time forward. Mr.

G. W. Berridge (J. I. A., XIX., 351) went very elaborately into the subject to ascertain what effect selection had upon policy values. He stated: "In the experience tables, as in other tables derived from similar sources, the annuity values appertaining to any year of age are deduced from the mortality of lives entering at that and all other ages; the net premium, therefore, at any age is not strictly applicable to a life examined and found in good health at that age, as the expectation of life at that age has been diminished by the inclusion of lives entering at younger ages who, as a mass, have deteriorated and increased by the continual influx at higher ages of examined lives." He utilized the material of the H^M Table to obtain annuity values, applicable to recently selected lives, and to those which had entered within five, ten, fifteen, twenty and more than twenty years previously. The annuity value for a life of the present age x, employed to value policies in force not more than five years, depended on lives which entered at the five ages, x, $x-1$, $x-2$, $x-3$ and $x-4$, next birthday, and who at the time of valuation were about to enter their first, second, third, fourth and fifth complete office years. The facts by which the assurances would be valued would be as follows:

Age at Entry.	Years of Assurance.	
$x-5$	5, 6, 7, 8.....	to the end of life.
$x-4$	4, 5, 6, 7.....	
$x-3$	3, 4, 5, 6.....	
$x-2$	2, 3, 4, 5.....	
$x-1$	1, 2, 3, 4.....	

The value of the annuity deduced from these facts would be for age x. In determining the value of this annuity, others were also obtained by a continuous process, thus:

a_{x+20}	applicable	to	policies	effected	more than	20	years.
a_{x+15}	"	"	"	"	within	15—20	"
a_{x+10}	"	"	"	"	"	10—15	"
a_{x+5}	"	"	"	"	"	5—10	"

Mr. Berridge's system has been considered too elaborate for practical purpose.

Mr. King, in 1876 (J. I. A., XIX., 381), presented the first part

of a most important paper on the subject of "Mortality amongst assured lives, and how policy values are affected thereby." Mr. King prepared and graduated ten mortality tables for ages at entry 20, 25, 30, ... 65, from the tables of "Exposed to Risk" and "died," as given in the Mortality Experience, H^M, of the Institute. To secure sufficient material, and do away as much as possible with accidental fluctuations after the first ten years of assurance, he combined the entrants in quinary groups, taking with the entrants at age x those who entered at the two ages younger, $x-1$ and $x-2$, and those who entered at the two ages older, $x+1$ and $x+2$, thus making x the central age of the group. It will be recollected that Mr. Higham followed a somewhat analogous plan. Mr. King's value of p_{x+n}, where n is not less than 10, gives the probability of a person aged $x+n$ living a year, deduced from the observed mortality amongst persons aged $x+n$ who have been assured for $n+2$, $n+1$, n, $n-1$, $n-2$ years, respectively. Mr. King states, in referring to his method of procedure: "During the first ten years the medical examination at entry must exercise a decided but rapidly decreasing influence, while the selection against the company caused by discontinuance is at its strongest. It is consequently of importance to avoid mixing those who have been assured, say, five years, with those who have been assured six and seven years, or only three and four. The numbers, moreover, are sufficient to render it unnecessary; and for the first ten years of each table, I have brought into account the exposed to risk and the deaths for that age at entry only which appears in the heading, in this respect forsaking Mr. Higham's lead." The lives remaining under observation, after a considerable number of years had passed, became so reduced in numbers that they were not considered sufficient to form satisfactory averages, even with the quinary groupings, and towards the close of life Mr. King combined the observations for all ages at entry. The probabilities after age 60, "for ages at entry 20 and 25 were made identical. For ages at entry, 25 to 45 inclusive, the probabilities at 80 and upwards are formed from the combined experience of all ages at entry, while for the rest of the tables the analysis of mortality is continued up to age 89." The Institute's Experience having been taken out on the basis of calendar years, the material required adjusting, and in this connection Mr. King said, in dealing with the first two years: "In the mortality experience the rate of mortality for year 0 of assurance is the annual rate for the

latter half of the current year of life in which the policy is effected, but there is no method of finding from this the true rate for the whole year. Mr. Higham encountered the same difficulty and got over it by combining the mortality of years 0 and 1. Mr. Berridge involves the mortality of years 0, 1 and 2. I do not like either of these methods, because if there be any force in what is called selection against the company, we lose sight of it by mixing the mortality in the year 0 with any other." Mr. King got over the difficulty by treating the year 0 as a complete year; the effect of this was that the years of life failed to coincide with the years of insurance. A comparison of the premiums for whole life and term insurance, according to Mr. King's Analyzed Mortality Tables and the Institute's Mixed H^M Table, was made, with the result that it appeared that the premiums based on the latter at the younger ages were decidedly too low, while those at the higher ages were not, in a corresponding degree, too high.

Doctor Sprague's labors in connection with Select Life Tables have been most valuable, and his results would appear to give what has been long desired. The compliment paid him by the Council of the Institute in asking that he allow his results to be published in a separate volume with important additional tables, indicates the regard in which his efforts are looked upon by the profession. He concludes a paper, in 1876 (J. I. A., XX., 95), by saying "that when proper allowance is made for the effect of selection, the premiums for 50 upwards are reduced, and those for 45 downwards increased. At the youngest ages, 20, 25, the increase is about 5%; from 30 to 60 the difference is so small as to be of no practical consequence, but for 65 and higher ages the true premiums are greatly less than those obtained from the mortality table formed in the usual way." Basing his results on the Institute's H^M Table, he combined in a single group the entrants of each consecutive five years. The entrants at, say, ages 63, 64, 65, 66 and 67 were combined and assumed to be entrants at age 65, or rather at age 65½, since it was shown that, according to the Institute's method of dealing with the facts, the lives were entered six months too young at entry. In transforming the facts from calendar years to policy years, the number of deaths in the insurance year 0 were taken at one-half, so as to harmonize with the numbers in the exposed to risk column, since those figures had already been halved to obtain the rate for year 0 of the Institute. Doctor Sprague pointed out that in grouping the facts for several ages at entry, and

assuming that the average age of the lives in the group is equal to the middle age, an error is committed. To rectify this error, he reduced to the same radix, 100,000, the numbers entering at each age. Doctor Sprague calculated the number dying in successive half years for each quinquennial age at entry, so as to assist in passing from calendar years to policy years. The values of q_x obtained were graduated by the graphic method and made to join smoothly on to the $H^{M\,5}$ Mortality Table after five years, or, in some cases, after a less period. This important condition of assuming that the ultimate mortality is represented by the $H^{M\,5}$ Table, which latter is considered a standard table and is held in high repute, has the advantage of limiting the number of select tables, and places in comparatively convenient form a complete set of tables, capable of being used with great ease and of affording results of a most important character.

As intimated at the opening of these notes, Select Life Tables have come to be very generally used by British Life Offices in preference to Mixed Life Tables for the purpose of determining premium rates. An examination made some time ago of the office rates of these companies showed that in several instances the rates in use were hardly to be justified in view of the investigations that had been made into select mortality, and it was stated that it was no secret that insurances could be secured in some life companies at less than the true net rate. It will doubtless prove of some practical interest to examine into the effect that the employment of a select life table would have on net premiums for various forms of policies, and I do not know of any more suitable table to take as a basis for this than Doctor Sprague's Select Life Tables. The table employed for comparison with it is, of course, the Mixed H^M Mortality Table of the Institute, which contains in the aggregate the same material as that included in Doctor Sprague's Select Life Table. The rate of interest assumed is 3½%.

"Table 1" gives for quinquennial insurable ages on the ordinary life plans of insurance (a) the select premiums (b), the mixed premiums, and (c) the excess or defect of the former over the latter. At age 20 the mixed rate is less than the select by from 8% to 11% of the select rate, the percentage increasing with the increasing term for which premiums are payable. On a 10-payment life policy the defect is $2.82 per $1,000 of insurance; on the 20-payment life plan it is $1.91 per $1,000 of insurance; on the whole life plan it is $1.41 per $1,000 of insurance. At age 35 the difference

ranges from 6 to 24 cents per $1,000 of insurance. The last ages at which defects are shown are as follows:

Plan.	Age.	Amount of Defect.
10-payment life	35	.06
15 " "	36	.02
20 " "	37	.03
25 " "	41	.01
30 " "	42	.01
Life	43	.03

For each age (except at age 38 on the 20-payment life plan, where the tables give equal values) beyond the ages just referred to, the mixed premiums are higher than the select premiums, the difference gradually increasing as the age increases. The excess of the mixed over the select on the 10-payment life plan at age 60 ($2.93), is slightly higher than the defect at age 20 ($2.82); while on the whole life plan at age 65, the excess of the mixed over the select is almost double what the defect is at age 20. As the bulk of insurance is applied for at ages less than 35, it may be said that for most of the insurable ages the net premiums on the life plans are less than they should be, and that the younger the life, the greater is the shortage.

"Table 2" gives the same information in respect to endowment insurances for 10, 15, 20, 25 and 30 years. At age 20 the excess of the select over the mixed ranges from 1% to 5% of the select, or from $1.32 to $1.04 per each $1,000 of insurance. The shorter the endowment period, the smaller is the excess. The last ages at which an excess of the select over the mixed appears is given below.

Plan.	Age.	Amount of Defect.
10-year endowment	26	.06
15 " "	29	.01
20 " "	31	.06
25 " "	34	.03
30 " "	36	.03

After the ages specified above (except at ages 32 on the 20-year endowment plan, and 37 on the 30-year endowment plan, at which

ages the two tables give equal values), the mixed overtakes the select. At age 60, on the 10-year endowment plan, the mixed exceeds the select by $3.21, or by more than three times the amount ($1.04) which the select exceeds the mixed at age 21. For most of the insurable ages the select exceeds the mixed on the 20, 25 and 30-year endowment plans, that is, for those endowment insurance terms usually selected.

"Table 3" refers to 15, 20, 25 and 30-year endowment insurances by ten annual payments. The select premiums at the age of 20 on the 15-year endowment plan exceed the mixed by $1.28, or 2% of the select, and by $2.02, or 4% of the select, on the 30-year endowment plan. The last ages for this group at which the select exceeds the mixed are as follows:

Plan.	Age.	Amount of Defect.
15-year endowment by 10 payments....	27	.06
20 " " " 10 "	28	.06
25 " " " 10 "	31	.01
30 " " " 10 " ...	32	.05

"Table 4" treats of single premium policies, and in view of the increasing number of this form of policy, the facts brought out are significant. On the whole life plan the select exceeds the mixed by no less a sum than $20.92 per $1,000, or about 7% of the select. This difference gradually decreases as age advances, but does not entirely disappear until age 43. At each age after the mixed is in the ascendency, the excess being $6.76 at age 60, or slightly over 1%. The differences in the endowment assurance single premiums at age 20 vary from $2.45, where the endowment term is ten years, to $13.20, where it is thirty years, or from less than 1% to 3% of the select. The last ages at which the select single premiums exceed the mixed are:

Plan.	Age.	Amount of Defect.
10-year endowment.....	26	.14
15 " "	29	.06
20 " "	32	.02
25 " "	34	.23
30 " "	37	.02
Life.....	43	.29

It is quite noticeable that after the mixed overtakes the select, the differences do not increase so rapidly as before. Take, for example, the life plan ; the turning point is between ages 43 and 44 ; at age 28, fifteen years earlier, the difference is $7.17, while at age 59, or fifteen years later, the difference is $6.29.

When the net premiums are loaded, the differences referred to will, of course, be aggravated. I have no doubt, if it were possible to construct Select Life Tables from other mortality experiences of assured lives, that defects of a somewhat similar character to those referred to would be found if a comparison of premium rates were instituted.

SELECT LIFE TABLE. NET ANNUAL PREMIUMS. LIFE. 3½ PER CENT.

Age.	Whole Life.	Life 10 Payments.	Life 15 Payments.	Life 20 Payments.	Life 30 Payments.
20	$14.71	$36.54	$26.93	$22.25	$17.82
21	14.92	36.85	27.15	22.43	17.98
22	15.14	37.19	27.40	22.64	18.16
23	15.40	37.59	27.69	22.88	18.37
24	15.69	38.03	28 02	23.16	18.61
25	16.00	38.52	28.39	23.47	18.88
26	16 36	39.08	28.81	23.82	19.19
27	16.75	39.70	29.28	24.22	19.53
28	17.18	40.38	29.79	24.65	19.92
29	17.64	41.11	30.34	25.12	20.33
30	18.14	41.89	30.92	25.62	20.77
31	18.68	42.71	31.54	26.15	21.25
32	19.21	43.51	32.14	26.68	21.72
33	19.78	44.34	32.77	27.23	22.22
34	20.37	45 19	33.42	27.79	22.74
35	21.00	46.06	34.10	28.39	23.29
36	21.66	46.97	34.81	29.02	23.88
37	22.37	47.92	35.56	29.68	24.50
38	23.12	48.91	36.34	30.38	25.17
39	23.92	49.96	37.17	31.12	25.87
40	24.77	51.05	38.05	31.90	26.63
41	25.67	52.19	38.96	32.71	27.43
42	26.62	53.36	39.90	33.56	28.27
43	27.61	54.56	40.87	34.45	29.16
44	28.65	55.80	41.87	35.38	30.09
45	29.74	57.05	42.88	36.32	31.06
46	30.88	58.34	43.93	37.31	
47	32.09	59.66	45.02	38.35	
48	33.37	61.03	46.19	39.46	
49	34.73	62.44	47.40	40.62	
50	36.18	63.91	48.67	41.85	
51	37.71	65.43	50.00	43.16	
52	39.34	67.02	51.42	44.54	
53	41.08	68.70	52 90	46.02	
54	42.94	70.47	54.49	47.60	
55	44.93	72.31	56.17	49.31	
56	47.04	74.22			
57	49.28	76.23			
58	51.66	78.31			
59	54.16	80.45			
60	56.81	82.64			
61	59.59				
62	62.55				
63	65.79				
64	69.29				
65	72.83				

SELECT LIFE TABLE. NET ANNUAL PREMIUMS. ENDOWMENT ASSURANCE.

3½ PER CENT.

Age.	10 Years.	15 Years.	20 Years.	25 Years.	30 Years.
20	$86.70	$55.00	$39.56	$30.62	$24.96
21	86.59	54.88	39.46	30.54	24.91
22	86.44	54.77	39.38	30.48	24.88
23	86.31	54.69	39.32	30.44	24.88
24	86.20	54.62	39.27	30.43	24.90
25	86.10	54.58	39.24	30.44	24.95
26	86.04	54.56	39.25	30.48	25.03
27	86.03	54.57	39.28	30.56	25.15
28	86.05	54.61	39.35	30.66	25.30
29	86.08	54.66	39.44	30.79	25.47
30	86.16	54 74	39.56	30.96	25.68
31	86.24	54.83	39.70	31.14	25.91
32	86.29	54.90	39.82	31.32	26.14
33	86.35	55.00	39.97	31.52	26.40
34	86.39	55.09	40.12	31.73	26.68
35	86.43	55.21	40.30	31.97	26.99
36	86.48	55.34	40.51	32.23	27.34
37	86.55	55.50	40.74	32.53	27.73
38	86.65	55.69	41.00	32.88	28.16
39	86.77	55.91	41.29	33.26	28.64
40	86.93	56.18	41.63	33.69	29.17
41	87.12	56.46	41.99	34.16	29.75
42	87.33	56.77	42.39	34.68	30.37
43	87.57	57.11	42.83	35.24	31.05
44	87.83	57.46	43.31	35.84	31.78
45	88.11	57.83	43.81	36.47	32.57
46	88.40	58.22	44.36		
47	88.71	58.66	44.96		
48	89 06	59.17	45.63		
49	89.43	59.73	46.35		
50	89.84	60.35	47.16		
51	90.29	61.03			
52	90.81	61.79			
53	91.43	62.64			
54	92.16	63.58			
55	92.92	64.63			
56	93.77				
57	94.72				
58	95.75				
59	96.86				
60	98.02				

SELECT LIFE TABLE. NET ANNUAL PREMIUMS. ENDOWMENT ASSURANCE BY 10 ANNUAL PAYMENTS. 3½ PER CENT.

Age.	15 Years.	20 Years.	25 Years.	30 Years.
20	$74.63	$64.98	$57.27	$51.18
21	74.50	64.84	57.14	51.07
22	74.35	64.70	57.01	50.98
23	74.23	64.58	56.91	50.92
24	74.12	64.48	56.84	50.90
25	74.04	64.41	56.81	50.92
26	74.00	64.38	56.82	50.99
27	73.99	64.40	56.89	51.12
28	74.02	64.46	57.00	51.30
29	74 07	64.55	57.14	51.51
30	74.16	64.68	57.34	51.78
31	74.26	64.83	57.56	52.08
32	74.33	64.95	57.75	52.36
33	74.41	65.09	57.97	52.68
34	74.49	65.23	58.19	53.02
35	74.57	65.39	58.43	53.38
36	74.67	65.56	58.71	53.78
37	74.79	65.77	59.02	54.23
38	74.95	66.01	59.38	54.73
39	75.14	66.30	59.80	55.29
40	75.38	66.62	60.26	55.92
41	75.64	66.99	60.78	56.60
42	75.93	67.39	61.34	57.32
43	76.24	67.83	61.94	58.11
44	76.58	68.31	62.59	58.94
45	76.93	68.81	63.27	59.81
46	77.31	69.35		
47	77.72	69.93		
48	78.19	70.57		
49	78.70	71.26		
50	79.25	72.02		
51	79.86			
52	80.54			
53	81.34			
54	82.24			
55	83.20			

SELECT LIFE TABLE. NET SINGLE PREMIUMS. 3½ PER CENT.

Age.	Whole Life.	10-Year Endowment.	15-Year Endowment.	20-Year Endowment.	25-Year Endowment.	30-Year Endowment.
20	$303.18	$719.41	$619.26	$539.14	$475.19	$424.65
21	306.08	719.14	618.75	538.54	474.56	424.20
22	309 29	718.80	618.28	538.01	474.05	423.92
23	312.89	718.51	617.90	537.60	473.74	423.89
24	316.87	718.23	617.63	537.32	473.63	424.11
25	321.22	718.01	617.43	537.14	473.70	424.58
26	326.00	717.86	617.34	537.15	474.04	425.37
27	331.26	717.83	617.40	537.39	474.67	426.52
28	336.92	717.88	617.58	537.83	475.55	427.97
29	342.85	717.96	617.80	538.36	476.60	429.62
30	349.17	718.13	618.13	539.11	477.93	431.60
31	355.78	718.33	618.54	540 00	479.43	433.82
32	362.26	718.45	618.84	540.77	480.83	435.98
33	369.01	718.58	619.24	541.68	482.41	438.43
34	375.90	718.69	619.65	542.65	484.08	441.05
35	383.05	718.78	620.15	543.77	485.94	443.91
36	390.44	718 89	620.72	545.01	488.00	447.05
37	398.10	719.05	621.40	546.42	490.31	450.53
38	406.05	719.28	622.19	548.00	492.95	454.36
39	414.28	719.56	623.13	549.77	495.88	458.55
40	422.81	719.95	624.23	551.76	499.08	463.12
41	431.52	720.38	625.41	553.90	502.54	467.99
42	440.42	720.87	626.70	556.23	506.27	473.17
43	449.50	721.42	628.09	558.82	510.28	478.69
44	458.68	722.00	629.52	561.56	514.49	484.49
45	467.93	722.64	631.00	564.38	518.91	490.58
46	477.33	723.30	632.58	567.42		
47	486.89	724 01	634.31	570.71		
48	496.70	724.79	636.32	574.32		
49	506.66	725.62	638.53	578.20		
50	516.85	726.52	640.87	582.40		
51	527.22	727.52	643.46			
52	537.77	728.65	646.30			
53	548.47	730.01	649.40			
54	559.42	731.56	652.81			
55	570.54	733.17	656.49			
56	581.75	734.95				
57	593.06	736.91				
58	604.36	739.01				
59	615.64	741.21				
60	626.85	743.50				

Abstract of the Discussion of Papers Read at Previous Meetings.

THE TENDENCY TO NATIONAL SUPERVISION. ELBERT P. MARSHALL.

Page 109, Vol. V.

Mr. Whiting: In a discussion of this character I shall limit myself to the points immediately before us, and not make excursions into other subjects, such as the evils of State supervision or its possible remedies. That is not the subject under discussion. At a proper place and time I might have something to say upon that topic. The question that is before us is one of National supervision and its probabilities for betterment or for attainment, and the probable scope of such National supervision. I think the subject divides itself into two distinct topics. There is National supervision *per se*, and there is National supervision as exclusive supervision —excluding all other supervision. As far as National supervision is concerned, *per se*, I am in favor of it. Not but that it would add another department to which you would have to report—another department with power of making examinations, criticisms and possible annoyances—but, in my opinion, a department which belonged to the National Government would acquire such an ascendency and such preponderance over the other departments that the effect of it would be to minimize the action of the others, and to harmonize that action—an object very much to be desired, and one at which the National Convention of Superintendents has earnestly aimed. It has the greatest desire, seeing the effects of State supervision, to minimize them as much as possible and to bring about as much of harmony as circumstances will permit. Now, I think a National Bureau would have a considerable tendency in that direction. Its reports, in comparison with the others, would be likely to command more respect and following. The same thing in regard to many other details of insurance which come up—in regard to the time, place and manner of examinations, and all that sort of thing. For that reason I am in favor of National supervision, thinking that the good which may come from it in the respects that I have named will more than counterbalance the additional expense and the additional annoyance which it might provoke.

When we come to the other branch of the matter, as to the

feasibility of a National supervision which shall wipe out State supervision, I think the thing is so chimerical and so impracticable that I can hardly see how persons are willing to waste any time on it; and I am rather of the opinion that the amount of expression that we have heard in regard to it is rather an outbreak of protest against annoyance from State supervision than it is a hope of success along that line. There are some quotations in the papers which would lead one to suppose that Congress has the power to suppress State supervision. It has no such power. The Supreme Court of the United States, not once, but many times, has passed upon that question, and the Congress of the United States cannot override the Supreme Court of the United States. The only possibility is an amendment to the Constitution of the United States, giving additional powers to Congress, through a two-thirds vote of the various State legislatures, and that, I think, on its very face, would be a hopeless task. We are accustomed to refer back to the old case of Paul *vs.* Virginia, losing sight of the fact that there are many later cases—one only a couple of years ago—which very ably took up the whole subject and reviewed it. The case of Paul *vs.* Virginia was a fire case, in which the Court distinctly laid it down that the matter did not come within the provision which gave power to Congress over interstate commerce. Hooper *vs.* California was a marine case, and there the Court distinctly stated that such insurance was not commerce, nor an adjunct of commerce, and they decided in the same way, after reviewing all the other cases, that marine insurance and fire insurance are not within the purview of interstate commerce. To expect that there can be any other decision in favor of life insurance is out of the question. It certainly is not an institution of commerce. The reasoning of the Courts seems to be unassailable. They give a general view of what interstate commerce is, explaining generally that it is the removal of goods from one place to another, and the instrumentalities by which that shall be done. It carefully excluded, for instance, bills of exchange. It said, Bills of exchange are not instruments of commerce. They are a very frequent thing in business, but they are not instruments of commerce. They decided, in a St. Louis case, in which certain brokers dealing in exchange objected to the payment of a tax, that their business was not interstate commerce and therefore they must pay the tax. On the other hand, bills of lading, in a celebrated case from California coming before the Supreme Court of

the United States, were decided to be necessary instruments of commerce and that they could not be taxed. In the same way warehouses and wharves are held to be instruments of commerce. Without commerce they would not be in existence, and they are exempted from any interference on that account. The Supreme Court holds that if it should include into the purview of what belongs to the domain of Congress all these new ideas of what is commerce there will be no end to it. You can hardly conceive of a thing that, in some way or other, does not come into some relation to commerce. Consequently, the domain of Congress would be extended over almost anything which the individual can do. That was not the intent of this provision in the Constitution. It intended to grant a definite provision, so that the action of Congress shall not be widened beyond its natural scope; and so firmly is the Supreme Court fixed in that view that I don't see how it is possible to dislodge that opinion.

The question of National supervision, so far as I know, first arose some twenty years ago. It arose in the Chamber of Insurance. The matter was very carefully considered, lawyers were advised with, in the hope that in some way they might succeed in getting National supervision and doing away with the annoyances of State supervision. But, after very careful consideration, it dismissed the attempt as being impracticable. The next time it was taken up was by the National Board of Fire Underwriters. They thought possibly there might be some way out and conceived the same idea. They considered the matter and dropped it. The next consideration given to the subject—and it was a very careful consideration—was by the assessment companies. They looked all over the question and came to exactly the same conclusion—that they could not do anything. It has now been taken up practically, you may say, by individual effort, and two bills have been introduced in Congress, which have gone to sleep quietly in the hands of committee.

Supposing a bill of that kind were passed by Congress, would we be any better off? The question would have to come before the Supreme Court, on its constitutionality, eventually. It is presumable that it will follow precedents, and you will have nothing excepting a National Bureau, coördinate with the rest; but as to its having any compulsory or repressive powers over the rest, other than what might follow from example, I don't believe for a moment.

There is National supervision in Canada. It works very well. There is no question about it. I believe those who live under it have nothing but commendation for it. But the state of affairs in Canada is very different from what it is in the United States. You have there a number of companies, none so very much greater than the rest as to have any tremendous predominance, and they work along together very nicely and very quietly. The field is not large, the interests which are involved are not so tremendous, but supposing that you had here one exclusive supervisory bureau, what would result? I think we should simply have the evils of State supervision intensified. We would have them all piled in together. You would have one dictator, instead of a number of smaller, disconnected men. Now there is some relief in supervision, because you can always fight one department against another, if that department is clearly wrong; and that the evils of State supervision have gone no further than they have is more due to the fact and the efforts of earnest, respectable commissioners than to any other one source that I know anything about. But if you had a National supervision, you would have one man there and he could carry the whole business in his grasp. You would have the intriguing of companies of tremendous power and influence to bear upon that man. You would have intriguing for his appointment; you would have intriguing for his control. The company having the control of that man would have an inside track against the others that would be enormous. The amount of temptation before that man would be something dangerous. A dictator is very good, provided he happens to be a very superior man in every respect. A dictatorship, perhaps, possesses more charm than any other one form of control, when you can guarantee the dictator, but if you cannot guarantee the dictator, you have got one of the worst forms in the world, and it is a great deal better to adjust yourself to the annoyances of a republican form of government, nowithstanding the fact that we know that the men that are in power are frequently of inferior understanding, and are more or less influenced by bad motives.

NOTE ON A PARTICULAR CASE OF LOANS REPAYABLE BY INSTALMENTS.

JOHN TATLOCK, JR.

PAGE 114, VOL. V.

MR. FRANKLAND: I think we all owe a debt of gratitude to Mr. Tatlock for the "Note on a Particular Case of Loans Repayable by

Instalments." Although such obligations may be less frequently met with in this country than in some others, the practical value of the investigation seems to me, nevertheless, to be important, while some of the theoretical considerations involved are, to my mind, of great interest. It is rather on the theoretical than on the practical side of the question that I would like to trouble you with a few remarks.

My attention has been called by Mr. H. W. Robertson, to a feature in one of the formulæ given by Mr. Tatlock, which opens up, as it seems to me, the old controversy as to the amount of interest which should be paid for a fraction of a year in the event of the principal sum of a loan being, for some reason or other, repaid in the interval between two successive due dates for the payment of interest. This problem has, as is well known, engaged the attention not only of professional actuaries, but also of some distinguished philosophers and mathematicians outside the actuarial profession. The great name of D'Alembert is identified with the doctrine, now generally accepted, that in every case of compound interest, when the interest is payable annually and the periods of conversion are supposed to be annual, the interest that should be paid for a fraction of a year is actually *less* than the corresponding sum that should be paid if we were making the assumption of simple interest.

It may perhaps be useful to here translate the words of D'Alembert on this subject, which have been quoted by Mr. Milne in Note 3 in his treatise on "Annuities and Assurances." Mr. Milne, as is well known, took the opposite side of the question, but I think that any one reading his remarks above referred to, and setting them against those which he quotes from D'Alembert, will probably come to a conclusion coinciding with that arrived at by the latter. D'Alembert's words in the "Encyclopédie," at the article "Arrérages" are:—"Many people suppose that to obtain the interest for half a year, it is necessary to take half of the interest for a year, one-third of the interest for a third part of a year, and so on; but they are in error. Let us consider what it is that happens in the case of compound interest. We shall find that the sums due at the end of each year are in a geometric progression, as can easily be seen. Now why should not this law obtain just as well for fractions of a year as for integral years? I must confess that I cannot see what can be the reason for such a distinction. * * * According to the hypotheses which we are combating, it is supposed that interest is to be

regarded as compound from one year to another, but that, during the course of a single year, it is to be treated as simple interest—a fantastic assumption, which cannot be admitted except in the case of an explicit agreement to that effect between the creditor and debtor. We shall treat this matter more fully in our article on 'Interest,' and hope to make it perfectly clear and to add various other remarks on curious points connected with it. But as the foregoing observation may be useful, and relates to a matter that is too little understood, we have deemed it our duty to refer to it in advance in the present article." A later article on "Interest" by D'Alembert contains the following passage: "Accordingly, in the case of compound interest the debtor, before the end of the first year, owes less than in the case of simple interest; therefore, if compound interest is favorable to the creditor in certain cases, it is favorable to the debtor in certain others. The compensation, it is true, is not equal, since the advantage to the debtor terminates with the first year and that to the creditor begins from then and goes on continually, increasing as the number of years increases; nevertheless, it is useful to have made this observation if it were only for the purpose of showing that simple interest in certain cases is not only less favorable to the debtor, but may even be regarded as unjust if the agreement is such that the debtor may be obliged to effect a liquidation during the course of the first year of the loan."

To those who still doubt the theoretical correctness of this view of the case, it seems to me that the most conclusive argument is formulated in the letter by Mr. William Orchard in Volume IV., of the Journal of the Institute of Actuaries of London, pages 61 to 65. Mr. Orchard assumes as his fundamental postulate that "Interest upon money for equal periods of time will be proportional to the amount lent." Then, if we put the equitable interest for £1 for half a year as x, the amount of £1 in half a year will be $1+x$. Further, by the fundamental postulate, in the second half-year this $1+x$ will accumulate to $(1+x)(1+x)$ which is equal to $(1+x)^2$. If r is the interest at the end of the year, by the wording of the contract it then appears that $(1+x)^2$ must be equal to $(1+r)$: whence it results that $(1+x)$ equals $(1+r)^{\frac{1}{2}}$. At about the time of Mr. Orchard's letter, the subject was elaborately discussed in the pages of the Journal of the London Institute of Actuaries, and I think it will be admitted by those who study the controversy as it then shaped itself, that the greater cogency of argument was on the side of the D'Alembert doctrine and against the Milne doctrine.

THE PROVINCE OF EQUITY IN LIFE INSURANCE. WALTER S. NICHOLS.

PAGE 117, VOL. V.

MR. GORE: The fundamental position held by equity in all the important problems of life insurance is set forth by Mr. Nichols in a most scholarly manner. The function of equity being understood, the query arises, are the interests of policy-holders as equitably administered as they could be and should be? With a broader experience now than a generation ago do we give the insured the benefit of that experience? Is the business of life insurance on the high moral plane we wish to see it occupy? If not, it were wise for all in authority to peruse Mr. Nichols' paper, reading both the visible words and those that appear between the lines.

"Natural justice, honesty and good conscience" require that in framing contracts, securing business, making cancellations, dividing profits, maturing contracts, the companies consider most carefully the rights of *all classes* of their policy-holders.

The cost of new insurances, although not as excessive on the average perhaps as it was three or four years ago, is still greater than it should be for the best interests of the policy-holders. If all the companies—possibly a hopeless "if"—would agree to pay lower first commissions, a good many transient, unsatisfactory agents would drop by the way and leave a comfortable business of new and renewal commissions to the permanent and reliable men, and no real injury would be done to the better class of field workers. The number is legion of those men who, while temporarily hard pressed, have been attracted to life insurance agencies by the hope of high brokerage and who, after writing policies on the lives of their friends and acquaintances, have "dropt from the zenith like a falling star." Transient agents get transient customers and the morale of the business is lowered to the detriment of the interests of those insured. Excessively high first commissions are an inequity to existing policy-holders directly because of their cost and indirectly because of the nature of the business they encourage.

Equity has decreed that life insurance policies shall have a surrender value, but it has also decreed that surrendered policies shall first pay a surrender charge. Legislatures and competition have

forced this charge down to a minimum—to the disadvantage of those who continue their policies in force, whereas the disadvantage, if any must exist, should be rather on the side of those who withdraw. Mr. Nichols would have two elements enter into the surrender value, first the penalty for failure to continue a contract undertaken and maintained at considerable expense to the company, and second, the actual loss in vitality force caused by the withdrawal of a sound life. The present average surrender charges of the companies do not seem to me to be sufficient to provide properly for both of these elements. The absolute forfeitures of former days seemed harsh even though they were a legitimate part of legal contracts, and public sentiment on the ground of equity did away with them. But sentiment went too far I think and gives the retiring policy-holder, especially the one who lapses in the early years, a surrender value greater than he has earned and belonging to those who have been more persistent. When forfeitures were the order of the day those whose policies were lapsed made themselves heard so effectively that gradually surrender values were introduced. Legislators and the public in general do not hear from the quiet, persistent premium payers, while those who default in payments are more often of the class who make known to the world at large their grievances. Thus it is that legislation and public sentiment have come to give surrendered policies more than their just value. I believe that the average surrender charge of the present day is not as large as equity to old policy-holders demands.

Mr. Macdonald: The subject of inquiry in Mr. Nichols' paper, What is Equity in Respect to Life Insurance, opens up a wide field of discussion and involves, as he states, many of the problems which divide the actuarial world. To discuss these with the object of reaching a finality or unanimity of opinion is scarcely within the scope of this article or the limits of what may reasonably be expected, inasmuch as differences of opinion will always obtain in respect to the solution of any problem which cannot be determined according to a fixed rule but is dependent rather upon individual judgment. I will only refer to two or three of the points suggested in his article.

Technically I would not possibly disagree with Mr. Nichols' statement "Insurance is the antithesis of ordinary business; it contemplates a decided gain for one of the contracting parties at the expense of the other," but apply the same test to many ordinary

business transactions, and could not the same be said, inasmuch as they apparently lack the evidences of mutual gain. Regarded from a practical standpoint, is not insurance a business transaction, entered into by both parties, the insurer and the insured, clearly with the expectation of gain or advantage? The insuring company in consideration of the representations made in the application of a present payment, known as the premium, contracts to pay upon the happening of a certain event, the time of the occurrence of which is unknown, a fixed amount, designated as the sum insured. The insured contracts to pay the premium required and in return therefor, expects that upon his death his estate will be benefited to the extent of the sum insured. The premium has been computed upon the basis of certain reliable data and it is anticipated will be sufficient on the average, in a large number of cases, to enable the company to meet its obligations and leave a margin for profit or gain. For the insurer it is certainly a business transaction, not a philanthropic one. But does not the insured also expect to profit by the transaction? I think he does. Realizing the obligations, legal and moral, imposed upon him, he takes advantage of the means which life insurance offers to make some provision for his family in the event of his death in a way which is more advantageous to him than any other. He expects that his family will profit by the provision thus made. He also may expect to realize a direct personal advantage, inasmuch as the relief afforded him by the provision thus made for his family permits him to engage in other business undertakings to his pecuniary advantage, which in the absence of such protection, he would be morally precluded from doing. It has always appeared to me a mistake to attempt to divorce from insurance the idea that it is not a business transaction entered into for mutual advantage, and in adjusting the equities which it involves we must deal with them on a business, combined with a theoretical or mathematical basis.

I sympathize fully with Mr. Nichols' argument against the idea of individual ownership or interest in the reserve. Insurance is based on the law of average. Upon this basis the premium is first determined. It does not in the individual case represent the exact measure or present value of the liability assumed by the assurer, but the average payment required from a number sufficiently large to ensure normal results. This fact is so well recognized by all, even those who are least familiar with the principles of the business, that it seems scarcely necessary to state it. The law of

average is fundamental, it is the foundation upon which the superstructure must rest and it must be sufficiently broad and strong to bear the strain imposed upon it. The reserve is but the accumulation arising from the overpayments in premiums during the earlier years of the contract together with the accretions from interest thereon. It represents in the aggregate, together with the future premiums payable, the measure of the company's liability. Reasoning from analogy, if the premium is not the measure of the risk assumed in the individual case, is it possible to properly regard the reserve, which, in reality, is but a portion of the premium paid in advance, as the measure of liability in the individual case? It, like the premium, represents the average accumulation under a larger number of contracts. These considerations, together with the disparity in the standard of the various risks, physically and otherwise, which may have taken place since the inception of the contract, as indicated by Mr. Nichols, afford strong arguments against the idea of individual ownership in the reserve value of the policy. I am inclined to think, however, that when the contract provides for the allowance of the reserve, or a portion of it, as a surrender value, then, the question of individual ownership or interest in the reserve must be differently regarded. An entirely different status has been established by the terms of the contract and the company is held legally liable to pay on demand to the insured the reserve under the policy in the same manner as the sum insured.

Doubtless the fostering of the idea of individual interest in the reserve has induced to some extent the promotion of legislation regulating surrender values. We admit that the exigencies of the business render it necessary that some equitable allowance shall be made to the policy-holder who is unable to continue his contract, or, for other reasons, may desire to withdraw. The net reserve, I agree with Mr. Nichols, may form, possibly, as good a basis as any other which can be suggested for the determination of such equitable surrender value. The first consideration, however, should be the protection of the interest of the continuing members. The right to withdraw or to cancel the contract rests entirely with the individual. Equity suggests the imposition of some penalty or consideration in recognition of this one-sided agreement. The deviation which may be caused in the average standard of the risks by withdrawal should be considered. To measure the effect of this and apply it in the individual case is practically impossible.

To determine what may be considered the average effect and to impose an average penalty is the limit of our ability. The loss to the company by the withdrawal of a member who may have been purchased at a cost to the company, loss in volume of business, disturbance of investments caused thereby, etc., should all be taken into consideration. The vital interests of the company and its continuing members require the imposition of a penalty to compensate for the detrimental effect caused by withdrawal.

The causes operating in favor of withdrawal may not be continuously of the same effect; varying conditions, either internal or external, may operate in impelling members to withdraw more largely at one time than another, which suggests the possibility of a higher surrender charge being necessary under certain conditions than under others in order that the interests of the company and the continuing members may be duly protected. Differences in policy conditions, premium rates, plans and modes of business, all furnish arguments against the arbitrary determination by legislation of the surrender values which may be allowable. The keenness of business competition, together with the large number of existing companies, should be regarded as amply sufficient to safeguard the rights of retiring members.

Mr. Whiting: One of the questions which is raised in the paper of Mr. Nichols is the question of the ownership of the reserve; and it seems to me I detect a discordant note in that, which to some extent, in my opinion, impairs the paper. During the thirty years in which I have been connected with actuarial matters, this question of the individual ownership of the reserve has rambled round its orbit many times. It is a very interesting one. Mr. Nichols says, in one part, referring to the decision of Judge Bradley, in the Stratham case, "But when the Court went beyond this, and based its decision on quasi ownership of the reserve, it seemed to me it was treading on very uncertain ground." Now the question which is raised in the Stratham case is where a policy is silent in relation to what shall happen in the case of the cessation of the contract—in other words, where nothing is said in regard to what shall be paid—to whom shall the residuary sum in the hands of the company, generally known as the net reserve, belong? The Stratham case was a peculiar one. It arose on one of those old contracts in which there was no surrender value provision—before the war—where neither party was at fault. The policy-holder could not pay the premium, nor could the company receive his

premium, because a *vis major*—a power higher than either of the contracting parties—had declared that intercourse between the two sections of the country should cease; and the question finally came to the Supreme Court, as to how the equities of the case should be determined in that state of affairs. We have had, many times, the same subject presented to us, in the case of companies that have failed—cases in which the Court steps in with an injunction, stops the policy-holder from the payment of his premiums, or the company from the receiving of those premiums; and the decision in both class of cases has been alike, that there was, in relation to this residuary amount which we call the reserve, a quasi individual ownership on the part of the insured. Now there were few persons in the United States better qualified to pass upon that matter than Justice Bradley himself, who had at one time been actuary of the Mutual Benefit Life Insurance Company before he was called to the Supreme Court bench.

That case presented itself to his mind in this way: Here is a residuary sum which the company has in its possession, which has grown out of that particular policy. It is true that, in arriving at the premium that was charged, averages had to be considered, but, those averages once considered and determined in the individual contract, the whole matter became individualized. It was a definite sum that was agreed to be paid for a definite amount of insurance. It makes no difference how the actuary arrived at his amounts. That has nothing to do with the case.

When he applies it to that particular policy, it becomes an individual amount charged to that particular policy. No matter how it is arrived at, it is individualized. And when it comes to a case where the policy has ceased, equity must step in and see to whom and how much of the residue of said premium it shall return. You have got a certain definite individualized case, which does not depend upon the man's health, or that of the other members of the company. It is as if the company had insured nobody but himself; and the Court has got to deal with that alone; and when Judge Bradley brought out the decision that it was a quasi individual ownership, I think he made a bull's eye. He did not say it was an absolute individual ownership. He said it was a contingent individual ownership. Contingent upon what? Contingent upon going back to the same consideration of averages which has been holding all the way along the line. The Court said, "The company has not reserved the right to be the judge in its own case.

Neither party is entitled to be the judge in the case. It should be adjudged by outside parties, in the usual manner in which disputes are adjudged."

Now, what was his judgment? That in so far as the man made no selection against the company, the man had to stop his payments by reason of a war going on, therefore he was entitled to the full reserve. The Courts of all the States have made the same interpretation in connection with policies which cease because of the failure of the company. There is in these cases no selection against the company.

It seems to me that this is a right decision—that of quasi individual ownership—and is a solution of a question which otherwise would involve us in a great deal of confusion; and I think it is practically the line upon which we all do business at the present time. The word "quasi" qualifies that ownership. It was intended by Justice Bradley to do so. The man's money is there. The reserve belongs to him in a contingent manner in the company's hands. It belongs to him in connection with the general transaction. Consequently, if he desires to destroy that connection, he must do so without injuring others. If he wants equity, he must do equity. Consequently, the surrender charge is an equitable consideration or deduction, and it is the "quasi," in the judge's opinion, which gives full opportunity for that deduction.

Mr. Macaulay: Mr. Chairman, I will refer to only one item in Mr. Whiting's remarks, and that very briefly. Let us take, for example, the case of a man who is far gone in consumption. I think all of us will admit that, no matter what the law says, such a man's family has a very much larger interest in his policy than the mere net reserve on that policy; and if, in a final settlement of an insolvent company, he or his children were considered to be creditors for only the amount of the reserve or, say, for one or two hundred dollars out of each thousand dollars of the assurance, I, for one, would think it a terrible injustice, and that, instead of being a case of equity, it would be a case of gross inequity.

And then, following up that idea, it seems to me that if we admit that a man who is in bad health has an interest in the company beyond the amount of the net reserve, then we must at the same time admit that the man who is in over-average health, and likely to live beyond the average expectation, has an interest in that company less than the amount of the reserve. The reserves, as has been pointed out, are based upon averages; and if one

policy-holder has an interest in excess of the reserve, it necessarily follows that others, who are in better health than the average, have less interest in their policies than the technical reserves which, on the average, would attach to their policies.

Mr. Miller: One suggestion occurs to my mind, brought up particularly by Mr. Whiting's remarks, and comments upon that. Mr. Whiting suggests that in the case of a war, such as we had between the North and the South, when communication between the policy-holder and the company was broken irreparably, or in the case of an insolvent company which is turned over to a receiver, where practically the same state of affairs exists, that because of the inability of the human intellect to determine nicely these abstract relations existing between impaired and healthy lives, we are, of necessity, driven to a similar settlement of the question, forcing us to a recognition of the quasi ownership in the net reserve, and a settlement on that basis. I want to throw out a mere suggestion—no more. I think that there is a method by which human ingenuity can practically handle such cases as that, with very excellent and fair results, and with perfect safety; and the course that I have in mind to recommend would be this: Take the case of an insolvent company, as a simpler matter than that of a company whose membership is disrupted by war. Unquestionably the same principle can be extended to both cases. Here is an insolvent company. It is true that its net reserves *in toto* are impaired. At the same time it seems to me that it would not be unfair to say that the loss which the company has sustained, owing to the misfortunes experienced, or owing to the bad management of the officers, is a loss which should be distributed among all the membership in proportion to the theoretical net reserves. If we admit that, we then find this insolvent company in the condition of having only one-half of the net reserve on each policy required for complete solvency. If a cash dividend is then paid to each policy-holder, equal to fifty per cent. of the theoretical reserve, a certain kind of very crude justice has been done, such justice as results from Judge Bradley's decision. It may be said that it is fair, because the same principle is applied to all. This man may be ill, that man may be well, but no one knew in advance whether the condition of affairs between those two might not have been reversed. It is a matter of chance, after all; and if the same principle is applied to every member, it cannot, I think, be fairly said that a gross injustice has been done to any one. But,

on the other hand, a practical injustice has been done, which ought to be corrected. We have this accumulation of money, representing fifty per cent. of the total reserve. What has that money been paid to this company for? It has not been paid to this company to be considered as a savings bank deposit, and to be simply refunded to the policy-holder as a savings bank would declare a dividend to its depositors. Of course, if the policy contracts include cash surrender values, a somewhat more complicated state of affairs has arisen. But let us leave that out as an extraneous matter, and let us suppose there is no contract for surrender value or paid-up policy. Suppose we have simply got the old contract, which is to be carried out in its entirety, without any provision being made for disruption. Now then, all the money that the insolvent company holds at the time of its becoming insolvent was paid to that company for insurance to be rendered in the future. It has become impossible for the company to utilize that money in exactly the manner it was intended to be utilized. It cannot completely carry out its contracts, but one thing it can do. It can be told to go ahead. It is insolvent; it has no right to demand the future payment of premiums by its policy-holders, because it has proved it is unable to live up to its part of the contract. But it can be directed, in my judgment, to simply apply all of that accumulated fund to the purposes for which it was originally paid in, and to as great an extent as circumstances will permit. Following out that line of argument, the company, it seems to me, might be told "Use all this money to pay all of your contracts as they mature." In other words, use the reduced reserves to buy extended insurance at single premium term rates. By that means every man will get as much insurance as his money, left in the hands of the company, will permit the company to give him. The company will approximately carry out the purpose for which that money was paid. I don't consider this any more than a crude suggestion.

Mr. Hall: Mr. President, the subject of the distribution of the funds of insolvent companies was very fully discussed by this Society a few years ago, apropos of a paper by Mr. Henry W. Smith on that subject.

Mr. Lee: In regard to this particular case, Mr. President, Mr. Smith's remarks were following the line that had already been very fully exploited by Mr. Homans, with regard to a discussion over the Charter Oak affair. If you remember, the idea was to make the reserve good by premium loan notes, and then that gave

fair insurance to each member that was in impaired health and to those that were in good health. That is, if you make the impairment good by premium loan notes, and the company can go on and be managed honestly, there is no injustice and no inequality.

Mr. Macaulay: Mr. President, I wish to express my pleasure at the remarks made by you, because you have expressed my opinions on many points much more forcibly and much better than I could myself. My own views are that any system which departs from the nature of the contract, and gives cash instead of assurance, is bound to work injustice to some of the members, and I quite agree with Mr. Whiting, that if you are going to pay a cash dividend, it is practically impossible to properly estimate the different shades of impairment which exist in different lives, and, therefore, practically impossible to do justice. But that difficulty arises because the contract has been departed from. The reserves, as you have well said, have been paid into the company not to be returned in cash, or as a savings bank deposit, but for assurance; and the practical solution of the whole difficulty in the case of an insolvent life company consists in paying them their value in assurance. There have been a good many plans suggested, and this one of extended insurance, to which you have referred, has something in its favor, as also has the plan referred to by Mr. Lee. But my own idea is that the scaling-down system which prevails in England, and which forms part of the English law, is the best system which has been suggested. The Courts there have authority to authorize the transfer of the business of a company to any other company approved by the Courts, which will take over all the contracts on an equitable scaling-down basis.

Mr. Whiting: That is, horizontally scaled down?

Mr. Macaulay: That scaling down is not a percentage of the sum assured, but is a varying amount. Every policy-holder continues to pay the same premium to the new company that he paid to the old, but the deficiency in his reserve is made good by reducing the amount of his assurance. The man who has a small reserve has but little reduction made in the amount of his assurance because, as his reserve is small, his proportion of the total deficiency in the total reserves is also small; similarly, the man who has a large reserve has a correspondingly large amount taken off his policy.

NOTE ON PREMIUM LOADING. WALTER C. WRIGHT.

PAGE 129, VOL. V.

MR. STARR: Mr. Wright adds sixty per cent. to the death rate of the Combined Experience Table of Mortality at every age, and forms a new table representing the resulting increased rate of mortality. He then proceeds from this new table of increased mortality, with a four per cent. rate of interest, to compute the net single premium, and the reserves and death costs, for a thirty-year endowment insurance policy for $50,000 issued at age 28. Instead of writing his computed death costs in their appropriate column, he separates them each into two parts in the proportions of 5/8 and 3/8, and writes the greater part in the column of death cost and the smaller in the column of insurance expense, and exhibits the tabulated results of his computations as the scientific provision for meeting the normal death risks, expenses and reserves, of a policy written upon the Combined Experience Table of Mortality. The resolution of the computed death costs into a column of death cost and a column of insurance expense is made upon the apparent assumption that an increase of the death rate causes a proportional increase of the death cost, which will be seen to be erroneous if we consider the consequent rapid diminution of the number of lives exposed, or if we compare Mr. Wright's column of death cost with that in the *other part* of the table, which he uses as a foil to set off his own figures; for if the assumption were correct the two columns of death cost would be identical, whereas his is considerably the less in gross and in detail.

As an endowment insurance policy is a combination of two policies, for endowment and for term insurance respectively, entirely independent of each other; and as we have well established formulas for computing the premiums for these risks respectively, we can obtain the premium for the double risk by computing the premiums for the separate risks and adding them together, or, by using a combination of the two formulas, we can compute it at once. Mr. Wright computes his premium by the use of the combination formula and his table of increased or "loaded" mortality, and as the series of yearly initial reserves is simply the series of single premiums that would be charged at the different ages for the same conterminous risk, he computes them in the same way. It seems logical to conclude that the use of the same table of mortality and the separate formulas will give us initial reserves for the separate risks as trustworthy as are Mr. Wright's for the double

risk. I have made these computations, and the results will be found in the appended Table 1, together with the corresponding *net* reserves as computed from the Combined Experience and from the American tables of mortality for comparison.

It will be seen that Mr. Wright's plan makes provision for the insurance equal to the net provision from either of the other tables with ample, if not excessive, loading, while his provision for endowment is far below the net provision of either.

Table 2 is constructed as follows: Mr. Wright's total provision available at the beginning of the first year for the payment of insurance expenses is placed in column 1; in column 2, 4 per cent. interest on that provision; in column 3, the amount of the first two; in column 4, the computed insurance expense for the year; and in column 5, the balance after paying that yearly expense. This balance is carried into the first column as the provision available at the beginning of the next year for the payment of insurance expenses; and the same process is repeated for every year till the maturity of the policy. At the beginning of the twenty-fourth year the total provision has become negative, and at the maturity of the policy this negative result has reached the sum of six hundred and eleven dollars and one cent, showing that amount of discrepancy between his total provision for, and his computation of the yearly insurance expenses.

The conclusion of the whole matter seems to be that Mr. Wright's provision for normal death cost is insufficient; that his total provision for insurance is ample if not excessive; that his provision for endowment is far below the net provision required by the Combined Experience, or the American, Table of Mortality; and that his total provision for expenses fails sadly to meet his computed yearly expenses. And finally, I am constrained to conclude that Mr. Wright's method is unscientific and unsafe.

Mr. Wing: Mr. Wright says it is not apparent to him why companies should refuse to write an endowment insurance for a single premium of $21,024.85, "when voluntarily requested by acceptable risks," though the companies' rate therefor is $22,295.00.

The probable reason is that they do not consider the lower rate sufficent to provide for the contract and incidental expenses.

I do not suppose that Mr. Wright intends to make a distinction in rate of premium for insurance "voluntarily requested" and that secured by agents, for if he does, the anti-rebate laws of several States would be sufficient reason for declining the contract.

TABLE I.

SHOWING THE INITIAL YEARLY INSURANCE AND ENDOWMENT RESERVES REQUIRED FOR A SINGLE PREMIUM, 30-YEAR ENDOWMENT INSURANCE POLICY FOR $50,000, WRITTEN UPON A LIFE AGED 28 YEARS, AS REQUIRED BY THREE DIFFERENT TABLES OF MORTALITY, RESPECTIVELY.

Year.	WALTER C. WRIGHT'S MORTALITY.		COMBINED EXPERIENCE MORTALITY.		AMERICAN MORTALITY.		Age.
	Gross Insurance Reserve.	Gross Endowment Reserve.	Net Insurance Reserve.	Net Endowment Reserve.	Net Insurance Reserve.	Net Endowment Reserve.	
	$	$	$	$	$	$	
1	12,840.40	8,184.35	8,713.55	10,396.25	8,171.35	10,784.85	28
2	12,870.80	8,623.95	8,726.15	10,900.85	8,152.40	11,309.70	29
3	12,894.45	9,089.25	8,733.75	11,431.45	8,129.05	11,861.10	30
4	12,910.35	9,581.95	8,735.40	11,989.75	8,101.15	12,440.35	31
5	12,917.80	10,103.90	8,730.80	12,577.20	8,068.35	13,049.00	32
6	12,915.55	10,657.20	8,719.00	13,195.70	8,030.20	13,688.80	33
7	12,902.75	11,243.90	8,699.35	13,847.05	7,984.75	14,361.55	34
8	12,878.30	11,866.50	8,671.45	14,533.10	7,932.60	15,069.10	35
9	12,841.45	12,527.25	8,634.15	15,256.15	7,873.10	15,813.30	36
10	12,790.35	13,229.15	8,586.65	16,018.30	7,804.50	16,596.65	37
11	12,723.35	13,975.05	8,528.40	16,822.00	7,726.35	17,421.40	38
12	12,640.55	14,768.15	8,458.00	17,669.90	7,636.75	18,290.40	39
13	12,538.95	15,611.95	8,374.65	18,564.75	7,535.15	19,206.10	40
14	12,417.45	16,510.15	8,277.30	19,509.55	7,419.55	20,171.90	41
15	12,273.60	17,467.10	8,164.45	20,507.50	7,288.85	21,190.90	42
16	12,104.30	18,487.90	8,033.80	21,562.75	7,141.00	22,266.80	43
17	11,902.85	19,579.80	7,881.30	22,680.45	6,974.20	23,403.55	44
18	11,661.90	20,751.10	7,701.75	23,866.80	6,785.20	24,606.15	45
19	11,373.60	22,011.25	7,490.70	25,128.40	6,571.75	25,879.35	46
20	11,028.15	23,371.70	7,241.35	26,473.40	6,329.75	27,229.30	47
21	10,617.85	24,843.70	6,949.15	27,909.60	6,055.60	28,662.45	48
22	10,132.95	26,440.70	6,608.40	29,445.80	5,744.15	30,186.60	49
23	9,563.75	28,177.40	6,213.25	31,091.90	5,389.30	31,810.95	50
24	8,898.10	30,071.40	5,756.60	32,859.35	4,984.50	33,545.70	51
25	8,121.95	32,143.20	5,230.35	34,761.10	4,522.50	35,402.30	52
26	7,218.55	34,417.05	4,625.20	36,812.25	3,995.60	37,393.80	53
27	6,168.15	36,921.75	3,930.60	39,029.90	3,394.10	39,535.35	54
28	4,949.00	39,690.05	3,135.85	41,432.75	2,707.25	41,844.65	55
29	3,536.00	42,760.20	2,226.35	44,044.25	1,922.70	44,341.90	56
30	1,898.15	46,178.75	1,186.50	46,890.40	1,025.70	47,051.20	57

TABLE II.

A TEST OF THE SUFFICIENCY OF MR. WRIGHT'S PROVISION TO MEET ANNUAL INSURANCE EXPENSES.

Year.	Provision at the beginning of year. 1	4% Interest on Expense Provision. 2	Total Provision for Expenses. 3	Yearly Expense. 4	Balance after paying Yearly Expense. 5
	$	$	$	$	$
1	1,915.00	76.60	1,991.60	139.30	1,852.30
2	1,852.30	74.09	1,926.39	139.10	1,787.29
3	1,787.29	71.49	1,858.78	139.05	1,719.73
4	1,719.73	68.79	1,788.52	138.85	1,649.67
5	1,649.67	65.99	1,715.66	138.70	1,576.96
6	1,576.96	63.08	1,640.04	138.40	1,501.64
7	1,501.64	60.07	1,561.71	137.75	1,423.96
8	1,423.96	56.96	1,480.92	137.25	1,343.67
9	1,343.67	53.75	1,397.42	136.50	1,260.92
10	1,260.92	50.44	1,311.36	135.35	1,176.01
11	1,176.01	47.04	1,223.05	134.30	1,088.75
12	1,088.75	43.55	1,132.30	132.80	999.50
13	999.50	39.98	1,039.48	131.00	908.48
14	908.48	36.34	944.82	129.00	815.82
15	815.82	32.63	848.45	126.80	721.65
16	721.65	28.87	750.52	124.95	625.57
17	625.57	25.02	650.59	123.45	527.14
18	527.14	21.09	548.23	121.75	426.48
19	426.48	17.06	443.54	120.15	323.39
20	323.39	12.94	336.33	117.90	218.43
21	218.43	8.74	227.17	114.85	112.32
22	112.32	4.49	116.81	110.80	6.01
23	6.01	.24	6.25	105.50	—99.25
24	—99.25	—3.97	—103.22	98.70	—201.92
25	—201.92	—8.08	—210.00	90.05	—300.05
26	—300.05	—12.00	—312.05	79.15	—391.20
27	—391.20	—15.65	—406.85	65.35	—472.20
28	—472.20	—18.89	—491.09	48.15	—539.24
29	—539.24	—21.57	—560.81	26.70	—587.51
30	—587.51	—23.50	—611.01	.00	—611.01

Assuming no such distinction, Mr. Wright proposes to take from the applicant $21,024.85, insure him for one year at a net cost of $232.15, and then return to the man $21,258.30. Let us see how it will work out.

Premium to be received, - - -	$21,024.85
Less agent's commission, say 5%, - -	1,051.24
	$19,973.61
Add interest for one year at 4%, - -	798.94
	$20,772.55
Deduct cost of insurance, - - -	232.15
Leaving in the hands of the company, -	$20,540.40

The company cannot in equity return to the policy-holder $21,258.30, nor should it be charged with $21,494.50 as its liability under the policy, either of which results is expected under the plan as proposed.

The strength of Mr. Wright's arguments may be measured by his comparison of $3,185.15, present value of one expense margin, with $3,381.60, the accumulated future value of a much smaller loading, and his conclusion that the latter is "$196.45 more than the single initial expense margin provided by the company in the other case." Such a comparison has no force scientifically, and if meant for popular argument, it is misleading and disingenuous. This is also true of his statement that $21,024.85 is "an equally liberal premium" as compared with $22,295.00.

But the vital question at issue is whether the cost of insurance is a scientific measure for expenses or for a provision for expenses in premiums charged. In my opinion it is not. I believe the root of the error is in the separation of the reserve or so-called self insurance from the net amount at risk. This error has borne its fruit already in the partially successful attempt to legislate for surrender charges based upon future unearned costs of insurance without regard to the amount of capital withdrawn in canceling a contract originally made for a certain definite purpose. I never have considered the theory just or equitable, and a more careful consideration of Mr. Wright's paper and the one presented by him in 1890 confirms me in this judgment. The cost of insurance is properly based upon the net amount at risk and the age of the insured, but there are other factors affecting surrender charges and expenses which should not be ignored.

So long as commissions are paid as a percentage of the premiums, so long should expenses be apportioned somewhat on the basis now generally used. Regardless of commissions, it cannot be demonstrated, as proposed in Mr. Wright's exhibit, that there is any logical reason why a company should charge in the tenth policy year $135.35 for management of a fund of $26,019.35, and yet charge only $26.70 in the twenty-ninth year for the care of $46,296.25, or, to carry the theory to its extreme, why there should be absolutely no charge for expenses in the last year.

It is no answer to this to say that as now apportioned a margin for expenses on a single premium policy is lost sight of in the liabilities of the company. It is none the less in hand and applicable for the purposes intended. If it should be thought best by some process to set it aside as a liability and divert it from surplus, where it now appears, there would be no objection to the plan as a simple statement of the fact.

It is not a sufficient answer to the objections raised against Mr. Wright's plan that the reserve may be charged with what he calls "investment expenses." Such a division of the expenses could only be estimated at the best, and could not be accurately proportioned. It is impossible, for instance, to say what proportion of the salaries of the officers of an insurance company should be charged to insurance expense and what to investment expense. The reserve on a policy is clearly liable for a fair share of the general expenses of the company. In Massachusetts it is directly liable for a *pro rata* tax. Other States tax in proportion to the gross premiums collected, but no State in proportion to the cost of insurance without reference to other factors making up the premiums. But even if it were admitted as possible that the expenses of a company could be accurately determined, so as to show how much should be charged as insurance expenses and how much as investment expenses, Mr. Wright's plan, as I understand it, makes no provision for the investment expenses, except in the interest earned on the reserves. I therefore fail to see what particular object is gained by the plan. It does not decrease expenses nor benefit the policy-holder. Of course, whatever is taken off the margin for expenses must be added to the provision for interest earnings, so that if a premium is to be loaded in accordance with Mr. Wright's plan, it must, in consequence thereof, be based upon a lower rate of interest to make up the deficiency occasioned by the reduced loading.

Cost of insurance is a good measure for itself, but cannot, in my opinion, be made to serve as a right basis upon which to "compute the premiums, reserves, surrender charges and paid-up insurance and cash surrender values thereof."

The insurance committee of the Massachusetts Senate reported upon a bill recently introduced into that body, fixing such a basis, that it "ought not to pass."

The decision of that committee seems to me a right one.

The best mechanics do not make great use of combination tools warranted to do everything. The most skillful medical men do not advertise a panacea.

The work to be done and the cure to be effected each demands a special application for its particular requirement.

COST OF INSURANCE. M. W. TORREY.

PAGE 140, VOL. V.

MR. P. T. WRIGHT: I take the liberty of giving expression to a thought or two which have presented themselves to me in this connection. If we treat the reserve as a pure endowment according to Mr. Craig's theory, and consequently calculate the cost of insurance on the gross amount at risk, there will arise pure endowment accretions which must be added to the reserve fund to maintain it, and for which it will be necessary to prepare tables. By this method the reserve on the death losses will revert to this reserve fund, and in calculating the mortality gain or loss the same result will be obtained as by the ordinary plan, provided the reserve on the death claims be compared with the tabular pure endowment accretions necessary for the maintenance of the reserve and this difference be taken to modify the cost of insurance figured in the above way.

In the statement of Mr. Torrey on page 140, where he remarks "That if any company calculations regarding the mortality gain or loss, as compared with the tabular, are based on Mr. Craig's theory regarding the 'Cost of Insurance,' the results obtained will be incorrect," I think he means provided these pure endowment accretions are not taken into account, for to my mind the results obtained will be correct if an allowance is made for the gain or loss in these accretions, and I think that is the meaning which Mr. Torrey intends to convey in the paper, for further along in his

article he proves it. By referring to the table on page 142, column 6, we will find that the total tabular pure endowment accretions, amounting to $1,558.66, are necessary to maintain the reserve in this case, provided the death rate conforms to the mortality table, but as the death losses, amounting to $5,000.00, only contribute $1,074.37 (the reserve on these claims deduced from column 7), there exists a deficiency of $484.29 in the pure endowment accretions owing to the fact that the reserve on these death losses was not sufficient to meet the tabular requirements, hence we deduct the difference from $3,187.82, the cost of insurance on the gross amount at risk less the face value of the claims, making a net gain of $2,703.53, which is the same result as obtained by the ordinary method. In this connection it may be interesting to analyze this deficiency and the following table is inserted for that purpose.

Column 1.	Column 2.	Column 3.	Column 4.	Column 5.	Column 6.
Kind.	Amount.	Tabular Pure Endowment Accretions.	Accretions from Reserve on Death Losses.	Pure Endowment Accretions.	
				Excess (Col. 4—Col. 3.)	Deficiency. (Col. 3—Col. 4.)
Life	$100,000	$89.83	$76.79	....	$13.04
10 Payment Life	100,000	251.21	...	....	251.21
10 Year Endowment	100,000	513.36	877.74	$364.38	....
20 Year Endowment	100,000	202.63	....	....	202.63
10 Pay't 20 Yr. End't	100,000	361.46	....	....	361.46
20 Payment Life	100,000	132.81	113.54	....	19.27
10 Year Term	100,000	7.36	6.30	....	1.06
Total		$1,558.66	$1,074.37	$364.38	$848.67
				Net Deficiency=$484.29	

Column 1 shows the kind of policy; column 2 the amount of insurance; column 3 the pure endowment accretions, on each of the seven classes enumerated, necessary to be added to the reserve provided the actual deaths agree with the expected; column 4 the accretions from the reserve on the policies terminated by death; column 5 excess of accretions over the necessary amount; while column 6 shows the deficiency.

By glancing at this table one sees that the reserve released by death on the ten-year endowment class was more than sufficient to meet the requirements on a normal basis, while in all the other six

classes it was not up to the expected, resulting in the net deficiency of $484.29.

Let us now consider the question of the reserve affecting the cost of insurance. It seems to me that Mr. Torrey is fully justified in saying "That the reserve on a policy does modify the cost of insurance, basing the cost of insurance on the gross amount at risk as advocated by Mr. Craig" and I agree with him in this statement. Referring again to the table inserted above we see that it is necessary to have pure endowment accretions aggregating $1,558.66 in order to maintain the reserve on a normal basis. Now if the mortality experience agreed with the table the total reserve on the death claims would equal this sum, but if the reserve on the losses be less, naturally the nearer it approaches the tabular amount the less would be the deficiency in these accretions, and hence the smaller the amount to be deducted from this $3,187.82, and therefore the greater the net gain from mortality, consequently the less the cost of insurance. If, then, as Mr. Torrey suggests, the total death losses were on the term class alone, there would be an excess in this class of $24.14, while the other six classes would show a deficit of $1,551.30, making a net deficiency of $1,527.16, which, deducted from $3,187.82, would make the net gain from mortality $1,660.66. If the total deaths had occurred among the ten-year endowment policies there would have been in this class an excess of $1,680.99, while all the others together would lack $1,045.30 of the sum necessary to be on hand according to the table, resulting in a net excess of $635.69, which, as a consequence, must be added to $3,187.82, making the final result a gain from mortality equal to $3,823.51.

These figures reveal to us the fact that when the total deaths were assumed to be in the ten-year endowment class alone the mortality gain was $3,823.51, when distributed among all the seven classes, $2,703.53, and when in the ten-year term class alone, $1,660.66. We thus see that while in all three cases the difference between the cost of insurance on the gross amount at risk and the face value of the death claims remained constant, also the total pure endowment accretions necessary to maintain the reserve on a normal basis, yet the gain from mortality varied, and as the reserve on the death claims was the only other factor which entered into these calculations, the natural inference would be that the variation was due to this cause. Moreover, it is observed that the greater the reserve on these death claims, the smaller is the

deficiency in the pure endowment accretions necessary on a normal basis (in the ten-year endowment class there even being an excess), and consequently the greater the gain from mortality, resulting in a less cost of insurance, and therefore we see that the reserve on these policies did modify the cost of insurance.

MR. CRAIG: In regard to so much of Mr. Torrey's paper as criticizes my article on "Cost of Insurance," I desire to say a few words. Mr. Torrey says, "The considering of the reserve as a pure endowment will necessitate the preparing of new tables showing the tabular accretions to the reserve of the surviving policyholders from the reserve of those that die. Such a table, for want of a better name, I will call pure endowment accretions. These pure endowment accretions form what might be called the mathematical complement of Mr. Craig's theory, which is the logical end of the same. * * *" He then gives an illustration of this idea in the following table.

A little reflection on Mr. Torrey's part would have caused him to end this table with column 5, for it is evident that after deducting the natural premium, as stated in column 2, from the initial reserve as stated in column 1, the balance, improved at interest, *must* represent the total fund which the company would have in hand to meet its reserve on existing policies at the end of the fifth year, and therefore the addition of the so-called pure endowment accretions in column 6 is entirely superfluous. The items in column 7, purporting to represent the reserve at the end of the fifth year, are fictitious because they do not represent the terminal reserve on the amount of insurance *then* in force.

Later on in this article we find: "* * the following is a table illustrating a ten-year endowment for $1,000 issued at age 40, worked out for the entire ten years, on the theory of considering the reserve as a pure endowment."

If Mr. Torrey had kept close to his text and really considered the reserve as a pure endowment he would not have fallen into the error of disregarding the probability of the life surviving from year to year through the term. The same principle is involved here as in his Table A, and will be more fully developed if we multiply all the items in his Table D by the number represented as living in the mortality table.

It will be seen from the foregoing table that at the end of the tenth year there are 69,517 survivors, so that $69,517,000 is all the company is required to have on hand to meet its obligations. This

TABLE A.

ACTUARIES' 4%.

COLUMN A.		COLUMN 1.	COLUMN 2.	COLUMN 3.	COLUMN 4.	COLUMN 5	COLUMN 6.	COLUMN 7.
Cost of Insurance.	Kind and Amount in force at beginning of 5th year.	Initial Reserve.	Natural Premium.	Column 1 Minus Column 2.	Interest.	Sum of Columns 3 and 4.	Tabular Pure Endowment Accretions.	Sum of Columns 5 and 6. Terminal Reserve end of 5 years.
$1,079.87	Life, ... $100,000	$8,422.20	$1,124.70	$7,297.50	$291.90	$7,589.40	$89 83	$7,679.23
918.49	10 Payment Life, . . 100.000	21,523.10	1,124.70	20,408.40	816.34	21,224 74	251.21	21,475.96
656.35	10 Year Endowment, 100,000	42,830.10	1,124.70	41,705.40	1 668 22	43,373.62	513.36	43 886.98
967.07	20 Year Endowment, 100,000	17,586.20	1,124.70	16,461.50	658.46	17,119 96	202.63	17,322.59
808.28	10 P. E. 20, ... 100,000	30,490.00	1,124.70	29,365.30	1 174.61	30,539.91	361.46	30,901.37
1,036.89	20 Payment Life, . . 100 000	11,913.90	1,124.70	10,789.20	431.57	11,220 77	132.81	11 353.58
1,162.33	10 Year Term, . . . 100,000	1,723.20	1,124.70	598.50	23 94	622 44	7 36	629.80
$6,629.28			$7,872.90					
			4% Interest, 314.92					
	Craig's Cost of Insurance at end of year, $8,187.82							

		Column 1.	Column 2.	Column 3.	Column 4.	Column 5.	Column 6.	Column 7.
Age.	Number Living.	Initial Reserve.	Natural Premium.	Column 1 Minus Column 2.	Interest Earned.	Sum of Columns 3 and 4.	Tabular Pure Endowment Accretions.	Sum of Columns 5 and 6. Terminal Reserve at end of 5 years.
40	78,653	$6,745,202.627	$785,979.429	$5,959,223.198	$238,475.896	$6 200,058.684	$64,888.725	$6,264,947.409
41	77,838	12,875,961.960	794.258.952	12,081,703.008	483,296.142	12,564,999.150	134.737.578	12,699,736.728
42	77,012	19,169.750.028	806,777.712	18,362,972.316	734.540.456	19 097 512.772	210,319.772	19,307,832.544
43	76,173	25,630,310.175	824,039.514	24,806,270.661	992,229 498	25.798,500.159	293.570.742	26,092,070.901
44	75.316	32,257,918.116	847,079.052	31,410,839.064	1,256,421.512	32,667,260 576	386,672.344	33,053,932.920
45	74,435	39,050,982.920	874,015.770	38,176.967.150	1,527 108.460	39 704 075.610	490,824.390	40,194,900.000
46	73.526	46,009 850.338	907,678.470	45,102,171.868	1,804,107.462	46,906,279.330	610,045.222	47.516,324.552
47	72,582	53,130,386.910	943,275.672	52,187,111.238	2,087,458.320	54,274 569.558	743,602.590	55 018,172.148
48	71,601	60,415,348.578	981,721.311	59,433,627.267	2,377,368.003	61,810 995.270	894,153.288	62.705,148.558
49	70,580	67,865,352.040	1,022,068.980	66,843,283.060	2,673,711.560	69.516,994.620	1,063,005.380	70,580,000.000
50	69,517	.....	.....	.....	.....	.....	.....	.....

amount is the last item found in column 5, and so every other item found in column 5 will correctly represent the terminal reserve on existing policies, and everything after column 5, including "Tabular Pure Endowment Accretions," is superfluous.

Table D.

Actuaries' 4%.

	Column 1.	Column 2.	Column 3.	Column 4.	Column 5.	Column 6.	Column 7.
Year.	Initial Reserve.	Natural Premium for $1,000 Insurance.	Column 1 Minus Column 2.	Interest Earned.	Sum of Columns 3 and 4.	Tabular Pure Endowment Accretions.	Sum of Columns 5 and 6. Terminal Reserve at end of 5 yrs.
1	$85.759	$9.963	$75.796	$3.032	$78.828	$ .825	$79.653
2	165 420	10.204	155.216	6.209	161.425	1.731	163.156
3	248 919	10.476	238.443	9.538	247.981	2.731	250.712
4	336.475	10.818	325.657	13.026	338.683	3.854	342.537
5	428.301	11.247	417.054	16.682	433.736	5.134	438.870
6	524.632	11.742	512.890	20.516	533.406	6.594	540.000
7	625.763	12.345	613.418	24.537	637.955	8.297	646.252
8	732.005	12.996	719.009	28.760	747.769	10.245	758.014
9	843.778	13.711	830.067	33.203	863.270	12.488	875.758
10	961.538	14.481	947.057	37.882	984.939	15.061	1,000.000

REMARKS ON THE ADDRESS OF THE PRESIDENT, MR. B. J. MILLER, AT THE FALL MEETING OF THE SOCIETY, OCTOBER 7TH, 1897.

Page 186, Vol. V.

Mr. Van Cise: It is not my purpose to enter into any lengthy discussion of the interesting and suggestive address of our President, but only to briefly notice two of the many points which he has brought to our attention. One of these is the question of legislation to provide for surrender values of forfeited policies.

In my judgment it would have been much better for both companies and policy-holders if no such laws had ever been enacted, and I believe it would be better now for all concerned if every particle of such legislation could be wiped off the statute books. Our law-makers have proceeded upon false assumptions: one, that men are not competent to make their own contracts, and another, that the natural effects of competition cannot be trusted to lead the managers of companies to offer fair terms of settlement to their patrons. The evil effects of this species of legislation are shown in

the conflicting laws of the various States, and the supposed necessity for protection to policy-holders is a constant incentive in the legislatures of our forty-five States to the introduction of new bills by political demagogues who pose as benefactors for the sake of a little cheap popularity, or who hope to have a liberal fee as the price of the killing of their obnoxious measures.

Another mistake into which the honest friends of this class of legislation very naturally fall, is that a very large majority of those who lapse their policies are poor, unfortunate people, who are compelled by sheer necessity to cease their payments, while the fact is that a large majority is composed of those who simply get tired of paying out money with no immediate prospect of return, and of those who are "twisted" into other companies by the real or imaginary attractions placed before them by enterprising agents. No such lapse rate is known in Great Britain, and the Government there has never felt called upon to pass any laws to provide for surrender values.

It is my deliberate judgment, based upon twenty-five years of personal experience in keeping the accounts and making settlements at maturity with the holders of this class of policies, that what is now called the "old Tontine plan" was the best plan devised in recent years for keeping policies in force, and thus accomplishing the great end of life assurance, which is the protection afforded in case of the death of the life assured. Under this plan the hardships resulting from the forced loss of the reserve in a comparatively few cases, has been much more than counterbalanced by the benefits resulting to widows and orphans, and also to companies and their agents, from the wonderful tenacity with which contracts were kept in force after they were old enough to have any considerable value. The policy-holders themselves have profited by their persistent payments to a degree which will not be equaled under any other plan of accumulation, for, although the gain from lapses has been very small in comparison with what was expected when the plan was first introduced, the average expense of taking care of the business has been materially lessened, and the rate of mortality materially reduced, because of the impossibility of receiving surrender values until the end of the periods of ten, fifteen or twenty years. In my opinion, every company ought to have the right of issuing such contracts to-day, and every man ought to have the privilege of taking such a contract if he desires to do so.

If we must have so-called non-forfeiture laws, I am opposed to

any provision for automatic values, especially if such values are to be given in the form of extended assurance. While I believe in liberality towards policy-holders who can give a reasonable excuse for non-surrender within six months after lapse, I do not believe in offering rewards for negligence; and it seems to me that the selling of term assurance without medical examination is not a profitable business in which to engage, saying nothing about the temptation which extended assurance offers to those who get tired of the payment of premiums, and who still do not wish to lessen the protection to their families in case of death.

The other point which I desire to notice is the rate of interest to be used in the computation of reserves on new policies issued by American companies. I regret that I cannot agree with the President in his belief that there is as yet no reason to change from four per cent. For several years I have believed that three per cent. was the proper rate to be assumed, and this belief is being steadily strengthened as I observe the vast accumulations of capital and the decline in the rates of interest on various classes of investments. There is now scarcely a State or city with first-class credit that cannot borrow money at less than three and one-half per cent., and one of the largest savings banks in New York City recently announced that the rate on all of its mortgage loans would be reduced to four per cent. Large amounts of three and one-half per cent. railroad bonds are sold at a premium in Wall Street, and unless arrested by destructive wars, it seems as if we may expect a still further reduction in interest rates.

Actuaries will agree that the business of life insurance should be conducted on a safe and conservative basis, and that there should be no temptation to speculative investments in order to realize a high rate of interest. A three per cent. reserve would provide additional security on the one hand and remove the temptation to speculation on the other. I know that some careful and conservative managers and actuaries have thought that a change to a three and one-half per cent. basis was all that was necessary, at least for the present; but if we are to have any legislation or any uniformity of action in this respect, it seems to me best not to make "two bites of a cherry," but to adopt a rate which we can reasonably hope to be safe during the twentieth century, which is now so near at hand.

Constitution and By-Laws of the Actuarial Society of America, as Amended April 28th, 1898.

Constitution.

Art. I.—This organization shall be called "The Actuarial Society of America."

Art. II.—*Object.*

The Actuarial Society of America has for its object the promotion of actuarial science by personal intercourse, presentation of appropriate papers, discussion, and such other methods as may be found desirable.

Art. III.—*Membership.*

The membership of the Society shall consist of the subscribers and of such other persons, connected with actuarial pursuits, as shall be duly elected or admitted.

Art. IV.—*Officers.*

The officers shall consist of a President, a first and a second Vice-President, a Secretary, and a Treasurer.

Art. V.—*Council.*

The officers, with ex-presidents and six other members, shall constitute the Council. At the first election of members of Council, after the adoption of this article, two members shall be elected to serve for three years, two for two years and two for one year; and annually thereafter two members shall be elected for three years. No retiring member of the Council shall be eligible for re-election at the same meeting.

Art. VI.—*Duties of Officers and Council.*

The duties of the officers shall be such as usually appertain to their respective offices. The duties of the Council shall be in general to manage the affairs of the Society in the intervals between its meetings, to call meetings and to make arrangements for the same, to decide upon papers offered for reading and discussion, and to pass upon candidates to be presented to the Society for election.

Art. VII.—*Election of Officers and Council.*

The officers shall be elected by ballot at the annual meeting

for the term of one year. The President and Vice-Presidents shall not be eligible for the same office for more than two consecutive years.

ART. VIII.—*Meetings.*

The annual meetings of the Society shall be held on the last Thursday of April in each successive year. Other meetings may be called by the Council from time to time, and shall be called by the President at any time upon the written request of ten members; twenty days' notice of such meetings shall be given by the Secretary.

ART. IX.—*Associates.*

Any one twenty-one years of age, pursuing actuarial studies and looking forward to future membership, may, on the conditions hereinafter stated, be enrolled as an associate, and in such capacity may be present, without participation, at the meetings of the Society, and receive its publications. The conditions are, that he shall be nominated to the Council by at least two members of the Society; that notice of such nomination shall be given by the Secretary to each member of the Society; that, not less than twenty days after such notice has been given, his nomination shall be approved by the Council, with not more than one negative vote, and that he shall subsequently pay such examination fee and pass such preliminary examination as may be prescribed by the Council.

ART. X.—*Admission to Membership.*

Any associate, who has been such for at least one year, and is twenty-five years of age, may apply to the Council for membership. Every member of the Council shall be notified confidentially of such application at least twenty days before the meeting at which it shall be acted upon. If his application be approved by the Council he shall become a member on paying such examination fee and passing such final examination as shall be prescribed by the Council. Otherwise, no one shall be admitted as a member unless by the unanimous recommendation of the Council, followed by a unanimous ballot of the Society.

ART. XI.—*Quorum.*

Four members of the Council shall constitute a quorum. Ten members of the Society at any duly called meeting shall constitute a quorum.

Art. XII.—No resolution expressive of opinion shall be entertained at any meeting.

Art. XIII.—*Amendments.*

This Constitution may be amended by an affirmative vote of two-thirds of the members present at any meeting held at least three months after notice of such proposed amendment shall have been sent to each member by the Secretary.

By-Laws.

As Amended April 28th, 1898.

Art. I.—*Order of Business.*

At the meeting of the Society the following order of business shall be observed, unless the members vote otherwise for the time being:

1. Calling of the roll.
2. Address or remarks by the President.
3. Minutes of the last meeting.
4. The minutes of the last meeting read and passed.
5. Summary of the business transacted by the Council since the last meeting of the Society presented for its information and approval.
6. Candidates for membership considered and voted upon.
7. Reports of Committees and of Officers.
8. At annual meeting, election of Officers and Council.
9. Unfinished business; new business.
10. Reading of papers prepared for presentation to the Society.
11. Discussion of papers presented.
12. Reading of a summary of the business just transacted at the meeting for correction if necessary.
13. The Council meetings shall proceed in this order as far as it may apply to them.

Art. II.—Meetings of the Council shall be called whenever the President or four members of the Council so request, but not without sending notice to each member of the Council ten or more days before the time appointed; such notice shall state the

subjects intended to be brought before the meeting, and should other matter be passed upon, any member of the Council shall have the right to re-open the question at the next meeting.

ART. III.—*Duties of Officers.*

The President, or, in his absence, the next Vice-President in order, shall preside at meetings of the Society and of the Council. At the Society meetings he shall vote only in case of a tie, but at the Council meetings he may vote in all cases.

The duties of the Secretary shall consist in keeping a full and accurate record of the proceedings at the meetings of the Society and of the Council, sending out calls for the said meetings, and, with the approval of the President and Council, carrying on the correspondence of the Society.

The Treasurer shall send out calls for annual dues and acknowledge receipt of same; pay all bills approved by the President for expenditures authorized by the Society or the Council; keep a detailed account of all receipts and expenditures, and present an abstract of the same at the annual meetings, after it has been audited by a Committee of the Council.

ART. IV.—*Dues.*

Each member shall pay ten dollars, and each associate five dollars, upon entrance, and a like amount at each annual meeting thereafter, except in the case of members not residing on this continent, who shall pay five dollars at the times stated.

It shall be the duty of the Treasurer to notify by mail any member or associate whose dues may be six months in arrear, and to accompany such notice by a copy of this article. If such member or associate shall fail to pay his dues within three months from the date of mailing such notice, the Treasurer shall report the delinquent to the Secretary, by whom his name shall be stricken from the rolls, and he shall thereupon cease to be a member or associate of the Society. He may, however, be reinstated by vote of the Council, and upon payment of arrears of dues.

ART. V.—*Amendments.*

These By-Laws may be amended by an affirmative vote of two-thirds of the members present at any meeting held at least three months after notice of the proposed amendment shall have been sent to each member by the Secretary.

Abstract from the Minutes of the Annual Meeting of the Actuarial Society of America, held in New York, Thursday and Friday, April 28th and 29th, 1898.

FIRST SESSION.

"College Room," The Arena, 41 West 31st St., New York,
Thursday, April 28th, 11 A. M., 1898.

The meeting was called to order by the President, Mr. Bloomfield J. Miller, who, after the roll call, addressed the Society :

Gentlemen of the Actuarial Society :

At our last meeting it was remarked by one of our members that the death rate among our charter members had been unusually light; but, during the last six months, the inexorable laws of average have asserted themselves, and we now have to mourn the loss of Mr. Sheppard Homans and Mr. Henry Worthington Smith, who will no more contribute to our enjoyment and instruction. They will, however, continue to live in our memories. They did little, if any, evil, and the good which they did will live after them.

Our American actuaries, as a rule, are very busy men and carry very heavy burdens. This results especially from the almost phenomenal growth of American life insurance companies and the extraordinary rapidity of the evolution of American methods of business.

Only forty years ago there were but few American life insurance companies. They were then young and small, and issued only ordinary life and term policies, payable in one sum at death, and the modern principles of non-forfeiture and equitable distribution of surplus were unrecognized. In the "sixties" limited premium life

policies and endowments came into vogue, and non-forfeiture in the guise of paid-up and extended insurance commenced to be provided for. Annual distribution of surplus on scientific principles was also adopted, and tontine, or deferred dividend plans, were announced by some companies. Still, all policies were payable in one sum at maturity, and the companies did no banking business, except such as was inseparable from the maintenance and investment of the reserve and surplus. It is true that some experiments were tried with "return premium" plans, but, until later years, when used in connection with the "tontine" or "deferred dividend" plan, they met with no substantial success.

The "seventies" were marked with no special innovations, except the growth of the recognition of non-forfeiture principles, in the form of guaranteed paid-up or extended insurance values.

In the "eighties" great innovations were made. The "semi" or "limited" "tontine" plan was adopted by many companies, and guaranteed "cash" and "loan" values were provided for. Policies were also made indisputable after two or three years.

In the "nineties" still greater and more important novelties have been adopted, such as the retention of the proceeds of an endowment policy during the life of the insured, or of a life policy during a term of years, the company binding itself to pay interest in the meantime; or the payment of the policy in a given number of instalments, the amount paid being increased on a basis which in effect requires the company to act as a savings bank and guarantee a given rate of interest. When this principle is combined with an agreement to continue payment of the instalments during the entire lifetime of the beneficiary, so that the contract may not be completed for, perhaps, a hundred years, it seems as if but little room remained for further evolution in the matter of life insurance contracts.

It cannot fail to be recognized, however, that these modern contracts, which extend far beyond the term of the original policy, vastly increase the "banking" or "trust" element in the business, and call for increased conservatism in the assumptions governing future interest rates. It is not surprising that so much attention has been called to the question of interest assumptions, and that some companies have already adopted a three or three-and-a-half per cent. standard, in lieu of the four per cent. standard which has usually hitherto been considered amply safe.

It is, perhaps, open to debate whether the great expansion of the banking element, which results from the "instalment" and kindred plans, and the increased complications incident to them, have not reached a point beyond which it would be inexpedient to go; but it is not to be wondered at that, as before said, American actuaries have had their hands pretty full of late years.

I am of the opinion that the best thing that our American actuaries can do in the early future will be to concentrate their attention on the best methods of compensating agents and distributing expenses. No one will deny the importance of this subject and the comparative crudeness of the plans now practiced by the companies. There is, doubtless, much room for improvement, but it can hardly be inaugurated by any one company. It is only by continuous discussion and concerted action that improved methods are likely to be adopted.

Officers and members present at roll call and during the sessions:

Officers—Bloomfield J. Miller, President; George W. Phillips, 1st Vice-President; Oscar B. Ireland, 2d Vice-President; Israel C. Pierson, Secretary; John Tatlock, Jr., Treasurer. Other members of Council—David P. Fackler, William McCabe, William E. Starr, Elbert P. Marshall. Members—David G. Alsop, James M. Craig, Joseph A. De Boer, John K. Gore, Clayton C. Hall, Robert G. Hann, John M. Holcombe, Charles N. Jones, George H. Kirkpatrick, James M. Lee, Thomas B. Macaulay, William C. Macdonald, William A. Marshall, James W. Mason, Walter S. Nichols, Sydney N. Ogden, Maximilian H. Peiler, Gardner L. Plumley, George F. Salter, William S. Smith, Joseph H. Sprague, Morris W. Torrey, Joel G. Van Cise, Rufus W. Weeks, Archibald A. Welch, Daniel H. Wells, William D. Whiting, George B. Woodward, Peter T. Wright. Associates—Samuel S. Hall, John F. Roach.

The minutes of the meeting of October 7th and 8th, 1897, were approved as printed.

A summary of the business transacted by the Council was presented and approved. The Council announced that William R. Hitchins, Henry N. Kaufmann, John F. Roach, R. Montague Webb and Arthur B. Wood had passed the required examinations and had been admitted to Associate Membership.

The Treasurer presented his annual report. It, having been audited by Mr. JONES, was approved.

The Society then proceeded to the election of Officers for one year, and two members of Council for three years, in place of Messrs. BARKER and W. C. WRIGHT, their terms expiring. The result was as follows: BLOOMFIELD J. MILLER, President; GEORGE W. PHILLIPS, 1st Vice-President; OSCAR B. IRELAND, 2d Vice-President; ISRAEL C. PIERSON, Secretary; JOHN TATLOCK, JR., Treasurer; and JAMES M. LEE and THOMAS B. MACAULAY, members of Council for three years.

The Council recommended as delegates to the Second International Congress of Actuaries in London, May 16th–20th, 1898, Messrs. MCCLINTOCK, PIERSON, MACAULAY and WEEKS, and as alternates, Messrs. NICHOLS and WHITING. On motion, the recommendation was approved.

Mr. STARR, on behalf of the officers of the State Mutual Life Assurance Company, presented an invitation to hold the Fall meeting at Worcester, Mass. On motion, the invitation was accepted.

The amendment to Article IV. of the By-Laws, proposed at the October meeting, was then taken up for consideration. On motion, it was adopted as follows: "ARTICLE IV.—Each member shall pay $10.00, and each associate $5.00, upon entrance, and a like amount at each Annual Meeting thereafter, *except in the case of members not residing on this continent, who shall pay $5.00 at the times stated.*"

On motion, the delegates to the Congress were authorized to extend an invitation to the International Congress of Actuaries to hold the third meeting in New York in 1901; if not the third, then the fourth meeting, at a date which may be subsequently agreed upon.

On motion, it was voted to present to the Society for consideration at the next meeting an amendment to Article VIII. of the Constitution, changing the date of holding the Annual Meeting from the last Thursday of April to a day near the middle of May. The proposed amendment is as follows: Change the first sentence to read: "The Annual Meeting of the Society shall be held on the FIRST THURSDAY AFTER THE FOURTEENTH DAY OF MAY IN EACH YEAR."

The Society authorized the Council to make arrangements for the appropriate celebration of the decennial of the founding of the Actuarial Society of America.

Adjourned at 12.30 P. M.

SECOND SESSION.

THURSDAY, April 28th, 1898, 2 P. M.

Mr. MILLER in the chair.

The Secretary read letters which had heen received from the "Institute of Actuaries" and the "Permanent Committee on Actuarial Congresses," expressing sympathy with the Actuarial Society in the loss sustained by the death of Mr. Sheppard Homans, who died on January 8th, 1898. The Society voted to acknowledge appreciation of these expressions of sympathy, and requested the Secretary to communicate the action to the Institute and the Committee.

At the request of the Council, Mr. MILLER presented a minute concerning Mr. SHEPPARD HOMANS. (See page 280.)

On motion, it was unanimously adopted.

The President having announced the death of Mr. HENRY WORTHINGTON SMITH on February 3d, 1898, on motion he was authorized to appoint a committee of one to prepare a minute.

Mr. JESSE J. BARKER was appointed. (See page 282.)

The Secretary being obliged to leave at this point, Messrs. TATLOCK and WELCH were requested to attend to his duties during the remaining sessions.

New papers were then presented as follows: (See pages 195—238.)

Adjourned at 5 P. M.

THURSDAY, April 28th, 1898, 7 P. M.

The usual dinner of the Society occurred in the "College Room" of The Arena. President MILLER presided. After dinner there was an informal discussion on the subject of War Risks.

THIRD SESSION.

FRIDAY, April 29th, 1898, 10 A. M.

President MILLER in the chair.

On motion, Mr. OSCAR B. IRELAND was appointed a committee to prepare and furnish to the members an abstract of terms upon which war risks are being assumed by the several life companies named.

The members then engaged in discussion of papers read at the previous meeting. (See pages 239—269.)

Adjourned at 12.30 P. M.

ISRAEL C. PIERSON,
Secretary,
141 Broadway, New York.

SHEPPARD HOMANS.

Born 1831, April 12th. Died 1898, January 8th.

BY the death of Sheppard Homans the Actuarial Society of America has lost one of its most esteemed and respected members. The Society desires to express its high appreciation of him as a citizen, as an insurance man, and as a distinguished member of the Society, of which he was the first President.

Mr. Homans was born in Baltimore, Md., in 1831. He entered Harvard University in 1849, and soon became distinguished by his mathematical and scientific attainments, and, while still a student, the United States Government called him to Coast Survey Service, and, subsequently, appointed him astronomer for several exploring expeditions. On the death of Prof. Gill, in 1855, Mr. Homans was appointed actuary of the Mutual Life Insurance Company of New York, and was soon recognized as one of the foremost actuaries of the world. In 1864 and 1865 Mr. Homans perfected the American Experience Table of Mortality, which was based upon the experience of the Mutual Life Insurance Company (published 1859), but was modified and adjusted by a comparison with the experience of English companies. This table of mortality has proved to be an admirable exponent of the mortality prevailing among American insured lives. In 1862 Mr. Homans recommended the distribution of life insurance surplus upon the "contribution" plan, by which surplus would be distributed among different classes of policies substantially in proportion to the contribution of each class to the general surplus. This method was immediately adopted by the Mutual Life Insurance Company, and, within a few years, was adopted by all of the other American life insurance companies. Mr. Homans' innate nobility of character was shown by the frank manner in which he shared with a former subordinate the great credit which this new dividend system brought him.

Mr. Homans' services in the cause of life insurance would have been preëminent if they had been limited to the matters above

referred to, but his subsequent contributions to the welfare of the business were numerous and valuable. He was corresponding member of the English Institute of Actuaries, and enjoyed a world-wide reputation and respect.

Mr. Homans resigned from the Mutual Life in 1871, and, in 1875, organized the Provident Savings Life Assurance Society of New York, of which he was President until 1895, when he resigned, and accepted the appointment of consulting actuary.

For some time previous to his death, which occurred suddenly on January 8th, 1898, Mr. Homans was much interested in the subject of National Supervision of Life Insurance Companies. He prepared a very able brief, in which he presented the propriety and importance of regarding life insurance as a form of interstate commerce, and advocated the regulation thereof by the general government, instead of by the several state governments. At the time of his death he was actively employed in urging Congressional action looking to national supervision.

It would be difficult to name a man who had fewer enemies and more friends than Mr. Homans. His death is felt by his associates to be not only a great loss to the Society, but a great personal bereavement to its members. He will be missed socially as much as officially, and his genial, kindly personality will abide in the heart of each member of this Society.

It was resolved at the meeting of the Actuarial Society of America, held April 28th, 1898, to forward a copy of this minute to the family of Mr. Homans, and to incorporate it in the transactions of the Society.

HENRY WORTHINGTON SMITH.

Born 1836, March 2d. Died 1898, February 3d.

THERE is sadness in our hearts for another member gone before. Henry Worthington Smith, a charter member of this Society, died at his residence—Moore, near Philadelphia, Pa.—on February 3d, 1898, aged sixty-two years. He was born at Hadley, Mass., was graduated at Amherst College in 1859 as A. M., and shortly thereafter taught school for a time in the South. Later he became identified with the life insurance business as an agent, his fields of labor being in the New England States. On account of his mathematical attainments his attention was naturally drawn to the scientific side of the business and, as a result, he became successively engaged with the Hope Mutual, New Jersey Mutual, and the American Life Insurance Companies in an actuarial capacity. He was also an active contributor to the columns of the insurance journals, and his work in this direction was uniformly that of the thinker and accomplished writer as well as the life insurance expert. His later years were spent in editing an insurance journal which he founded and not until his failing health forced him to do so, did he relinquish his labors and cease his busy life. He was a graduate of the Law Department of the University of Pennsylvania, and a member of the Philadelphia and Delaware County Bars, also a member of the Union League Club of Philadelphia. He leaves a devoted wife and daughter upon whom his loss falls heavily; but to him the end came peacefully as a dream.

VOL. V. NO. 20.

PAPERS AND TRANSACTIONS.

OCTOBER 6TH AND 7TH, 1898.

GENERAL PRINCIPLES.*

EMORY MCCLINTOCK.

NO life insurance organization has ever yet wound up its business successfully. I do not refer to reinsurance or amalgamation, but to that blessed ending, not wholly impossible, which is contemplated by theorists when they say that a life company can go on without new business and gradually wind up its affairs by maintaining a reserve sufficient to pay every claim up to the end. In reality life insurance organizations either succeed or fail, and permanent success depends upon the permanent prevention of failure. A life company is not successful unless it is able to go on successfully throughout all time. What, then, are the essential plans and principles which must be followed by any life insurance organization aiming to endure throughout the future? It must be well managed, of course, energetically and prudently, but there are certain points and maxims peculiar to this business, developed by experience, and these are what we have now to consider.

First, your plans must be attractive to the public. Without this nothing can be done, for your first need is to be able to secure new risks without undue cost. I do not dwell on this point, because it speaks for itself, and will only call your attention to one or two illustrations. It is usually supposed that the coöperative plan is attractive but not secure, and that, notwithstanding its attractiveness, it fails because it is not secure. In reality the coöperative plan is secure but not attractive and in spite of its security it fails

* Part of an address before the National Insurance Convention, Milwaukee, September 14, 1898.

because it is not attractive. By a coöperative society I mean one which promises to pay in case of death such sums as it may actually collect. This plan is unquestionably secure, because it is impossible for such a society to fail to meet its engagements. It is true that the engagements are not burdensome, but such as they are, the society can always carry them out. Of all known business organizations, the coöperative society alone is always certain to be able to meet its legal liabilities. It can never be broken up by legal process, assuming its affairs to be managed without embezzlement. Nevertheless, in spite of their legal security, these conservative organizations do regularly and speedily come to an end because they fail to attract new risks. The plan which is attractive when the society is organized, and when deaths are comparatively few, because the risks have recently been scrutinized and none but good ones accepted, becomes anything but attractive, is, indeed, positively repugnant, when in the course of time the deaths become more frequent and the assessments more frequent. It is true that the old members who are still in good health become tired of increasing payments and that a large proportion of them discontinue their membership before many years, but if their places could be supplied by new risks in large numbers without much trouble or expense, the coöperative society could go on forever. The precise point wherein the plan necessarily fails is that after a few years the cost to new members is so great as to make it difficult to secure new members in sufficient numbers. If a man thinks of joining an assessment society he will join one newly organized, in which the assessments are still few, rather than an older one in which the cost is notoriously greater.

I have said that the first principle of life insurance practice is to make your plans attractive. One plan which is not attractive to the public is nevertheless apt to strike the fancy of those who seriously and honestly endeavor to avoid the necessity of a reserve. It requires the collection of a premium each year from each member exactly sufficient to pay the cost of his current insurance. This is known as the natural premium plan. It commends itself by one reasonable consideration which every one admits and yet which few seem willing to follow in practice, that a man ought to be just as willing to pay the current cost of his life insurance as a natural part of his current expenses, and without looking for any return in case he does not die, as to pay the cost of insuring his dwelling without looking for any return. You may take it as a

fact of experience, as a principle of human nature established beyond controversy, that the average man will not insure his life knowingly on that seemingly reasonable system which requires cash payments increasing from the beginning throughout life. It is true that societies nominally working on this principle are able to attract new risks, but in almost every case you will also find that in reality the payment does not increase much, if at all, while this process of attracting new risks is going on, and that the members expect that their payments will be kept down by dividends for a long period in the future, or perhaps permanently, because they see them kept down in the case of policies taken out heretofore. My point is that the natural premium societies in which the payments actually increase every year from the beginning are exceedingly few in number and quite recently established. They are working along faithfully and honestly, indeed, but against increasing difficulties, because no amount of argument can make their plan attractive to the average man. There are select souls here and there, like you and me, who are swayed solely by reason and who may be induced to join in forming a society of this sort. The difficulty is that in this commonplace world of ours there are too few superior beings like you and me, and that the average man will have nothing to do with the natural premium system in actual practice, with his annual payments increasing from the start. If you take the trouble to watch the progress of this little handful of societies working vigorously on that system, you will find one after the other giving up the struggle. One will adopt some system of dividends to prevent the payments next year from increasing above what they are this year; another will change its system and envelop itself in an atmosphere of reserve; and still another will go out of business altogether. The thing will not work and cannot be made to work.

It is sometimes supposed that the natural premium system is sounder than the system of assessment after death because the payments are made in advance. Assuming the assessments after death to be made upon an equitable system, I am unable to see much reason for this widespread opinion, though, of course, it is better to collect one or two assessments in advance. All plans which contemplate only current payment for current insurance, without reserves, are essentially the same in principle and open to the same objection. There is nothing radically unsound about the assessment system except the creation of dissatisfaction by the

increase of payments, and except, also, the absence of any penalty upon discontinuance; and precisely the same elements of unsoundness are to be found in the natural premium system.

I have mentioned as an element of unsoundness the creation of dissatisfaction by the increase of payments. This brings me to the second of the principles or maxims which I have to lay before you as essential to all sound plans of life insurance. You must not only avoid dissatisfaction in advance by making your plans attractive, but you must also arrange your plans so that they shall not create serious dissatisfaction in the future; and experience shows that while dissatisfaction may arise here and there for various reasons, there is one evil which may be relied upon invariably to create intense dissatisfaction, and this evil is the pressure of the increase of cash payments without prospect of speedy relief. For practical purposes, this second maxim, that you must guard against future dissatisfaction, may be condensed and embodied in this simple warning, that your plans must not be such as to require from the policy-holder at any future time a permanent increase in cash payments. That the average man cannot be persuaded to remain in a society knowing that he must pay more next year than he does this year, and that his payments must go on increasing thereafter as long as he lives, is a fact of human nature as it exists which must be kept prominently in the foreground as a vital practical fact, I might say as one of the most important of those warning beacons which are or ought to be familiar to every navigator on the sea of life insurance. It is already generally understood that new members are not easily secured if there is a clear agreement for immediately increasing payments. What is not so widely known is that the same intense dissatisfaction is produced among members already insured, if and when their time comes to experience a notable increase in their payments without prospect of relief. This state of things is so well settled by experience that it may be accepted as a solid fact of human nature. I do not say that it ought to be so; I agree that it ought not to be so; I only say that it is so. If you cannot educate new members, in the first flush of their zeal, to be content with increasing payments, how can you expect that old members, who have for a period of years been accustomed to making payments practically stationary in amount, and who have hoped that no increase would ever occur, will rest content when the increase is actually upon them? The experience of every assessment society which is past its youth

proves the contrary, and I may add that a like experience has attended every life company which has made any long-continued experiment with any plan involving increase of payments. The old premium note system in this country was a reasonable system for any one who understood it, but as the notes increased the cash payments for interest also increased, and the average policy-holder could not understand it and would not put up with it. Until some one society or company is able to show the working of increasing payments, without hope of relief, and without serious dissatisfaction throughout a period of years, and so to disprove this principle, we must continue to recognize as a guiding maxim that human nature rebels inevitably against increasing payments.

It may naturally be asked, what particular harm does it do if people do get discontented after five or ten years and discontinue their contributions? Does not the society always have a large number of risks in force whose period of discontent has not yet come, and can it not go on forever, taking in new members with payments practically stationary for a term of years, and letting them go when the time comes for the increase? These questions are reasonable questions. They indicate the point of view of men who have given considerable thought to the subject, and who honestly object to the accumulation of a reserve fund. They agree that new members will not come in unless their payments are in some way protected from increase for a considerable period after entrance. They agree that at some time in the future there must be a necessary increase, and that the average man will discontinue his payments in consequence. They have now and then heard good actuaries say that their companies have not suffered any notable increase in the proportion of mortality by reason of discontinuances. Granting that discontinuances must be numerous, and regretting the necessity of perpetually recruiting new members to take the place of those dropping out, they nevertheless see no unsoundness in the situation and no reason why a society working on that system should not go on successfully and permanently. To discuss this point intelligently and satisfactorily, it is necessary to examine with some care the effect of discontinuances upon the average quality of the risks remaining.

If you ask the actuary of any sound and popular life company whether the good lives have dropped their insurances in greater proportion than the impaired lives, his answer will quite probably be "No." You may thus obtain unimpeachable evidence that

various companies have not suffered appreciably by the lapse of good risks in undue proportion. A life company which retains its popularity does not, in fact, usually suffer on the score of vitality by reason of discontinuances. It may have many lapses in the first year of insurance, but the medical examination is in such cases so recent that the risks remaining during the second year are on the whole unusually good, and the like holds true until the fourth or fifth year. After the third year, the lapses in a popular life company are not so numerous, and those which do occur may be traced to one of three causes. The first cause is a change of circumstances, by which the policy-holder finds himself unable to meet his premium payments. It is believed that lapses of this class occur in greater proportion among those risks which have become deteriorated in health or in habits, so that the net effect of such lapses is probably favorable. The second cause is that the beneficiary may die or be otherwise provided for, so that the insurance is no longer needed. Lapses from this cause may be presumed to occur in fairly uniform ratio among risks of all grades, and, therefore, to have little or no effect upon the quality of the risks remaining. The third cause is a change of feeling on the part of the individual policy-holder, notwithstanding that he still needs insurance and is able to pay for it. Although the company retains its general popularity, this individual is no longer satisfied. Whether the fault is his own, or that of the agent who induced him to insure, or that of the agent of some other company who dislikes to see him go on wasting his money, this individual is dissatisfied and drops his policy. Since lapses of this class occur chiefly during the first two or three years of insurance, this cause of lapsing in popular companies is a minor one after three years. So far as it extends, however, the effect of it must be injurious, because good risks become effectively dissatisfied much more easily than impaired risks. Taking all three causes of lapsing together, the effect of what we may call customary or normal discontinuances is not very noticeable one way or the other. After the fourth year of insurance, the death losses of a good company may be expected to range between 85 and 90 per cent. of the expected loss according to the American Table of Mortality. How is it now with the assessment society or the natural premium society? Instead of the small lapse rate after five years which is found in the life company, which becomes still smaller as years go on, until it is scarcely perceptible, the assessment society which

has been running along comfortably for a number of years finds itself, all of a sudden, subjected to a great proportion of discontinuances, nearly all of which are due to the third cause which I have mentioned—dissatisfaction. I ought to add that the assessment society is all along subject to depletion, in consequence of the adverse representations of agents of life companies or of rival societies. These representations are most effective with the best class of risks, who are able to secure insurance elsewhere and to pay for it. Whether worked upon by rival agents or actuated merely by discontent with the increase of their payments, most of those who drop out of assessment societies do so while still in good health, thereby increasing the proportion of impaired risks to the total of risks remaining in force, and the effect upon the average vitality of the risks remaining is damaging and before long disastrous. The damage wrought by this kind of general dissatisfaction is not only great, but cumulative. There is first a decrease in the number of risks in force, and then there is a greater proportion of mortality among those risks which do remain in force, that is to say, there is an excessive death loss. This increases still further the cost of insurance to the survivors, and this again increases the dissatisfaction, and so on, each form of evil increasing the other, so that assessment societies which once become the objects of general dissatisfaction are regarded by all experts as doomed to a speedy end.

Just here I wish to remark that in speaking of assessment and natural premium societies I leave out of consideration those mixed forms of society which have some other bond of union than pure life insurance. When there is no such other bond of union, such a society may be compared with the work of a party of children on the beach, who have constructed something resembling a ship's cable out of good, hard, moist sand. A cable of that sort is as sound as any other until you begin to use it. But if these children have put a core in the middle of their rope of sand, of a really tough material, such as a strong cord, or a steel chain, those who expect the structure to fall to pieces may be disappointed. If it were the custom of the British House of Lords to assess themselves whenever a death occurred among their number, the House of Lords would still hold together, notwithstanding any increase of assessments. In the same way it is quite possible for a professional body, a trades union or a fraternal society, to combine death loss assessments with other elements of their constitution in so small a

proportion that the dissatisfaction over assessments is counterbalanced by the cohesive power of the other features of the system. It is enough to say that death loss assessments are an element of weakness wherever they appear, and that whether this element of weakness is counterbalanced by other elements of cohesiveness and strength, disconnected from the assessment principle, is a question to be decided on the merits of each case in which such a combination appears. If the fraternal element is strong enough to carry the assessment element on its back, well and good. Again I beg you to observe that I am not decrying assessment societies when I explain their acknowledged deficiencies. Their central idea is honest and wholesome, that men should combine to bear one another's burdens. The benefits of the system are obvious and immediate, while its evils at first appear a long way off. It is true that the benefits which it renders to those who die early may be counterbalanced eventually by the betrayal of those who are no longer insurable when their societies go to pieces, yet those benefits have been rendered nevertheless, and rendered mostly to the families of those who could not have been persuaded to insure in any other way. Even those who are finally betrayed have mostly no right to complain, for they also could usually not have been persuaded to take the benefit of a sounder system. If it be said that the assessment system thrives chiefly among the ignorant and the prejudiced, it may be answered that no system can be wholly bad which persuades the ignorant and the prejudiced to insure their lives, even precariously and for a short time.

The acceleration of excessive death loss, due to widespread dissatisfaction, is, of course, not confined to assessment and natural premium societies. Thirty years ago there were many small and ephemeral life companies which, unless they were wound up suddenly on technical grounds, showed towards the end an excess of death losses as compared with the table expectation, this greater proportion of loss being due notoriously to the unwillingness of the good risks to go on paying premiums after impending failure came into view. Actual experience of every kind concurs to show that the acknowledged harmlessness of such lapsing as occurs in popular life companies affords no real basis of hope to the managers of societies in which payments must increase and in which members who discontinue have nothing to lose.

It is necessary to add this qualification, "nothing to lose." If every member of such a society were obliged to make with it a

large deposit on interest, to be forfeited in case of lapse, the powerful cohesive force of such a system might prevail against the annoyance of increasing payments and the wiles of rival agents. The idea of forfeiture is so unpalatable that some have come to regard all forfeiture as unjust. Is it so? Why should an assessment society or a life company be obliged to bear a burden for which it gets no pay and from which the fire or marine insurance company is free? These other companies can cancel any risk when it suits them. The life organization is required to carry its risk till death. It examines the risk once for all at the beginning, and if it gets a single premium for life, it makes a fair bargain. Both sides are on an equality. The company and the policy-holder are alike compelled to carry the contract for the whole of life. But when the company waives its equitable right to require in advance a single premium, accepting instead assessments or premiums at short intervals, and, without claiming the right to discontinue its liability, grants to its member the right to discontinue his payments without loss, it gives something for nothing. I have no time to elaborate this point, but beg you to bear it in mind. The fire company retains the right to close its risk at any time, but the life company relinquishes all claim to such a right for a consideration, and this consideration is called penalty, forfeiture or surrender charge. If it should impose no penalty it would give something for nothing.

Now arises another question. We have seen that a popular life company need not lose vitality through lapsing. When it incurs disfavor, and then only, it suffers loss in that way. Can it not afford to rely on the continuance of approval, and make itself still more popular by abolishing the penalty, even though it does admittedly grant a valuable option without consideration, and so gives something for nothing? I answer No, for two reasons. First, it has no right to hazard its permanent existence on the rash assumption that its operations through all future time can never meet a temporary check. A life company has too many invaluable interests in its charge to take wantonly the risk of disaster and bankruptcy arising from the speedy disintegration which, in the absence of penalties upon discontinuance, must occur whenever a cloud of distrust may envelop it in consequence of some temporary mismanagement or misfortune. And in the second place, we must recollect always that no popular life company has ever yet actually experienced the effects of the abolition of all penalties.

The penalty in some form has heretofore stood as a barrier against the assaults of rival agents. Can any one suppose that the life companies could successfully have preserved in force their due proportion of good risks, against all the interested and insidious assaults of rival agents, if there had been literally no penalty upon lapsing, if, for example, every policy-holder could have claimed at will, at any moment, his supposed technical proportion of the company's funds? No, you cannot presume that mere general popularity can protect you against rival agents if you impose no penalty; and apart from that, you have no right to stake the future existence of your company on the presumption that temporary misfortune or mismanagement can never possibly occur. A penalty is certainly just, for no one is bound to give something for nothing; and it is not only just but also absolutely necessary, in the absence of some other impregnable element of cohesion, to every society or company which means to endure for all time.

The first principle which I have enumerated is that you must make your plans attractive; the second is that you must guard against any future increase in cash payments; and now the third is that you must not permit discontinuance without compensation, in the absence of some other sure bond of union. If any one of these three fundamental principles is wholly ignored your society or company is unsound. On the other hand, of course, it is possible for a company to ignore one or the other of these principles in the transaction of a small part of its business, the remainder of the business being conducted judiciously, and in this case the resulting damage is only that which arises from that particular portion of the business. Take, for example, the renewable term plan. According to this plan a certain premium is paid annually for ten years, then a higher annual premium during the succeeding ten years, and so on, the premium increasing by steps every ten years. Companies which adopt this plan have usually endeavored to make their first premiums high enough to yield eventually dividends which may prevent in reality the future increase of payments which is nominally stipulated. If their foresight is good, so that the payments do not eventually increase, such companies do not infringe our second principle, which warns us against increasing cash payments. If their foresight is not good, the damage arises only from such part of the business as has been done on that particular plan. Again, it may happen that a plan which is unsound in one respect may be so useful in another that the

evil is wholly or partly counterbalanced by the good. Take, for example, the privilege of surrender without loss which is granted by many companies at a fixed period named in the policy itself, in connection with the deferring of all dividends until the end of the same period. This plan is defective in granting a privilege of surrender without loss, notwithstanding that the privilege is granted but once in the existence of each policy. On the other hand, apart from the attractiveness of the plan, it brings in a class of risks of unusually good quality, and this special advantage continues until the end of the critical period, the death losses among policies of this class being particularly light. The actuaries who originated this system many years ago knew that after the end of the period the loss on such policies as remained in force would be greater in proportion than before, and this expected result has actually taken place. When the period of maximum surrender value arrives the holder of the policy is besieged by every agent in his neighborhood, each of whom has had for years in his pocket-book a memorandum of the exact date when that precise policy would be available. In self-defense the agent of his own company is compelled to join in the scramble, or perhaps he, too, has had the same date in his pocket-book for the same reason. It results that a large proportion of the best risks claim their guaranteed values almost as a matter of course. The worst risks not only know that they need the insurance and cannot get it elsewhere but are advised by all their friends in the business to retain it. There are some bad risks who surrender and many good risks who refuse to surrender, but, on the whole, the proportion of good risks who surrender is much the larger. So far as anything is known concerning the experience of the companies which have been working longest on this plan, the loss from excessive mortality after the end of the period is just about what the actuaries predicted many years ago. The gain arising from this plan, due to lighter mortality before the end of the period, is no doubt greater on the whole than the loss from the heavier mortality afterwards. There are other forms of policy contract, involving options in the future, which open the door to adverse variations, by which, for example, a bad risk can increase his insurance or reduce his premium payment, or a good risk diminish his insurance, without compensation or penalty. As a rule, such options are introduced merely to make the policy more attractive at the beginning, but they are sure on the whole to make the business more expensive in the end, and

they are usually devoid of any such counterbalancing advantage as that which I have mentioned as belonging to the deferred dividend plan.

In addition to the three fundamental principles which I have formulated, there are various minor observations which are worth noting, but which I have no time to dwell upon just now. One is that plans requiring small premiums attract on the average a poorer class of risks than plans requiring large premiums. Another is that while making your plans attractive you must avoid making them especially attractive to bad risks or to persons contemplating partial or total suicide. Another relates to a form of fraud which consists in the understatement of age in order to reduce the premiums payable. To encourage frauds of this kind, it is only necessary to provide expressly in each policy that any one who understates his age, and so secures 50 per cent. more insurance than the premium for his real age will buy, shall enjoy all he pays for if discovered and 50 per cent. more if not discovered. Another observation is that if, for the satisfaction of honest men, a policy is made incontestable after a given period, it should at least retain some terrors meanwhile for those who bear false witness in making out their proposals for insurance. Another is that it is well to avoid any peculiarity of system which relieves policy-holders of the necessity for making their payments promptly at regular intervals. The law of Massachusetts was for many years objectionable in this respect, the companies of that State suffering severely in the resulting disorganization of their premium collections.

Returning to our three main principles, you must, apart from making your plans attractive, prevent any future actual increase in the annual cash cost, and at the same time you must provide for some compensation or penalty in case of discontinuance. Both of these necessary requirements are met by increasing the annual cash payment to a point which will obviate the necessity of any future increase, the excess of the earlier payments being held as a reserve fund. In after years, when the annual cash payment made by an aged policy-holder is no longer sufficient to carry the current risk on his life, the deficiency is made up by drawing upon the reserve fund. By thus securing an over-payment in the earlier years of insurance, the company secures also the needed element of cohesion, because the old policy-holder knows that he is paying less than he would now have to pay for the same insurance at his present age, and therefore knows that he is losing something if he

discontinues his insurance. The provision of a reserve, in short, prevents the injurious increase of cash cost and prevents also the possibility of discontinuance without loss. It is now generally conceded that a reserve of some sort is essential to the permanent welfare of every organization which devotes itself to the business of insuring lives. There is, however, some disagreement concerning the amount of reserve which it is necessary to hold for these purposes. It may be admitted at once that if the premiums and reserves are such as will certainly prevent any future increase of cash cost to individual policy-holders, they are also sufficient to discourage discontinuances. The disagreement to which I refer relates, therefore, only to the amount of the premiums and reserves necessary to preclude the possibility of increasing cost. Some hold that if the customary surrender values are withheld, the annual cash cost can be reduced to correspond, and this is certainly true. Other things being equal, the amount granted annually by the company in the way of surrender value in paid-up insurance or otherwise would, if saved, enable it to increase its annual cash dividends and thereby reduce the annual cash cost of each policy in force receiving such dividends. I will not discuss the justice or injustice of this sort of return to the old practice of universal forfeiture. It may be claimed, and cannot easily be disproved, that such a course would be entirely just if all concerned understood it and agreed to it from the beginning. In fact, there have been and are several plans of insurance which under other names have for a time possessed, without demur from any quarter on the score of injustice, these three characteristics, namely, low and uniform cash payments, small cash reserve, and no real surrender value. I will mention one or two of these plans for the encouragement of those who are endeavoring to place assessment societies upon some sounder basis, so as to secure practically level payments without holding full reserves. For their discouragement I have to add that as yet no one of these plans has been carried on successfully for so long a time as to remove all fear of its failure.

One such plan which has been practiced here and there by regular life companies is the renewable term plan, of which I was speaking awhile ago. While the premiums and reserves on this plan are small, the premiums have, nevertheless, in some cases at least, been computed expressly with a view to the prevention of any future increase in cost by the accumulation of surplus and the application of dividends to that purpose. The plan is still on trial,

with the chances apparently against its permanent success with the rates of premium heretofore charged.

A second instance may be found in a plan which some of us are old enough to remember, which has long been abandoned, but which for a time dominated the practice of life insurance in this country. It was called the half-note plan. One-half of each ordinary life premium was paid in cash, and the policy-holder gave what was called a note for the other half. In case of lapse the companies did not collect the notes but simply cancelled them. In case of death, the companies did not collect the notes, but again cancelled them. The losses were paid in full. The reserve was calculated in full, and the notes were claimed, and properly claimed, as technical assets, being in the nature of an offset to a portion of the reserve. The real cash reserve consisted of the nominal or technical reserve less the outstanding notes. No surrender value was paid, except, of course, the cancellation of the so-called notes. As the notes were marked up as assets, their cancellation in case of lapse was entered as a charge to the account of surrender values, and in case of death to the account of dividends. Looking only at the cash elements of the transaction, and disregarding these phantom notes, we see a reduced cash reserve, no real surrender value, no real dividend, but, on the other hand, the payment in full of the insurance money in case of death. As regards cash cost, there was a little increase for four years only. The first year the cash cost consisted of one-half the nominal premium. The second year the cash cost was 53½ per cent., the third year 57 per cent., the fourth year 60½ per cent. and the fifth year 64 per cent. of the nominal premium. There was no further increase, but the cash cost remained fixed at 64 per cent. of the nominal premium. The increase which took place for a few years represented interest on the outstanding notes, because every year a note was taken for 50 per cent. of the nominal premium, and interest was collected at the rate of 7 per cent. The reason why the cash cost never increased above 64 per cent. of the nominal premium was that the number of notes outstanding never exceeded four. Whenever a new note was taken after the fourth, an old note was returned and charged on the accounts as a dividend. The policy-holders submitted readily to an increase of cash cost for four years, because they knew that every policy more than four years old was relieved from further increase. The system was really neat and satisfactory as long as it lasted. It lasted until it broke down. It broke down

because the cash payments were too low, so that the burden finally became greater than the companies which practiced it could bear. Nevertheless, the system actually worked for many years, and the companies which practiced it built up considerable business, one of them becoming for a time the largest in the country. The precise point where the plan broke down was that the nominal dividends which the system compelled the companies to grant increased faster than the nominal divisible surplus. It was therefore necessary to reduce the dividends, which up to that time had amounted on each policy to exactly one-half of the annual premium, in addition to the dividends which consisted in returning notes after death. Fortunately, as it happened, it became generally agreed about that time that the proper method of dividing surplus was to make small dividends on new policies and larger dividends on old policies, in accordance with the so-called "contribution plan" for the division of surplus. It was therefore still possible to give fairly large dividends to the older policies, so that the actual increase in cost never became unbearable, but it was impossible to continue the half-note system in connection with the contribution plan of dividends, because there was no longer any definite certainty of a 50 per cent. dividend at the end of four years and annually thereafter. The change produced some discontent among the older policy-holders, but as they continued to receive fairly large dividends their cash payments did not increase beyond endurance. It was however necessary to drop the half-note plan for new business. The plan, which was effective and popular as long as the public believed that they could rely on the strict limitation of the outstanding notes, became untenable when they realized that the number of notes on one policy would increase to five, six, eight or more, and that in case of death the outstanding notes were no longer returned as mortuary bonuses, but were deducted from the insurance money paid. The stronger note companies were able to make a change to the cash premium basis and to continue business in good repute Some weaker companies failed. For a time some business was done here and there with notes equal to one-third the premium, but even as thus modified the note system did not survive.

Concerning all attempts to reduce premiums by reducing reserves and surrender values, we have just this criterion by which to judge. If the cash premiums actually paid by contented policy-holders are guarded against any serious permanent increase in the

future, beyond the possibility of doubt, the system is sound. Experience shows that the full level premium system is always safe, assuming ordinary good management, and experience has not as yet shown the same concerning any modification of the full level premium. The difficulty is just here: to insure safety, you cannot fix your premiums much below the usual non-participating figures; and unless you do fix them decidedly below those figures, the public will continue to prefer the customary plan which provides paid-up insurance in case of discontinuance.

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The net reserve system has many elements of advantage, but there is one evil connected with it which it was heterodox to discuss thirty years ago, but which is now widely understood and admitted. This evil consists in the requirement that a reserve must be laid aside out of the first year's premium. I am speaking particularly of ordinary life policies, and what I have to say requires qualification if applied to any other form. It has long been recognized that the expense attending the procurement of business is so great as to permit no actual accumulation of reserve out of the first year's premium. The risks have just passed the doctor, it is true, yet death losses will occur within the first year, and must be paid. Apart from the commissions to agents, there are other well-known expenses attending the prosecution of new business, and these other expenses are in some companies greater in amount than the commissions paid for new business. While not always strictly true, it may be laid down as a general statement that the commissions and the other expenses taken together will use up pretty much all of the first premium.

The highest living authority, Dr. Sprague of Edinburgh, called attention some time since to the fact well known in Great Britain, that the expenses of new business practically consume the first premium, and proposed that the reserve should begin to be accumulated out of the second premium. There is much to be said for this proposition, particularly in the case of companies newly organized, which have no assistance from any of the sources of miscellaneous profit which an established company possesses, such as annuities and non-participating insurances, and no penalties contributed by retiring policy-holders towards the expense of replacing the discontinued risks.

While other causes were at work, the chief cause of the universal slaughter of small companies which took place about twenty-five years ago was the legal requirement of a reserve in the first year of each policy. The energies which in this growing country might have been turned toward the establishment of new and prosperous life companies were directed by this reserve difficulty into another channel, and a great cry arose for life insurance without reserves. Had Dr. Sprague's proposal been available under our laws, we should have heard comparatively little of assessment insurance with all its good and all its evil.

What is the remedy? The old life companies do not need one; and yet there should be no legal distinction between them and the newer organizations. As regards the latter class, at any rate, the remedy is plain. Make no attempt to enforce State valuations. Repeal all laws assuming to regulate contracts. On the other hand, require of every society absolute publicity concerning the essential elements of its accounts, including its reserve valuations. It is many years since I first had occasion to express my opinion on this subject. My advice then was given in two words, in which I sum up my advice now: FREEDOM and PUBLICITY.

Individualism vs. Communism in the Conduct of a Life Insurance Company.

ARCHIBALD A. WELCH.

IN this brief discussion I do not lay claim to the enunciation of any original ideas, but have simply endeavored to bring together in a logical way the claims of many who believe that in the conduct of a life insurance company there are other interests to be considered than those of the individual policy-holder.

Life insurance differs from most other commercial interests in that it *requires* an association of many individual interests. It is impossible to conceive of the ordinary life insurance contract being issued except in connection with a large number of other similar contracts. Association of interests is indispensable to security, and this association is secured in the life insurance company.

A life insurance company may be described as follows : It is a combination of contracts, depending upon life contingencies, for mutual protection. It is, in effect, the machinery which takes the individual contract, that by itself, without this combination, would be valueless, and imprints upon it the guarantee which transforms it into a negotiable security. It is the material instrument by which the science of life insurance is applied to humanity, and without which the science would be valueless. Its duty and obligation is to carry out the individual contracts with the least possible risk and at a minimum of expense.

The company, then, is something more than the mere articles of association governing a number of individuals which have voluntarily come together for mutual protection. It is a living, breathing corporation, entirely different from the individual uncertainties which are its component parts, to which individuals have confided their interests, and on which they have laid the responsibility which they themselves are unable to carry : that of guaranteeing these uncertainties.

The insurance contract, to be of value, cannot stand alone by itself uninfluenced except by the laws of mortality and interest. It must be a component part of a vast machine to which it has confided its interests, and onto which it has shouldered all its responsi-

bilities. It is this machine, the company, which has too often been denied due consideration in investigating the questions of individual policy values and expenses.

Actuaries have consciously or unconsciously espoused the cause of "Individualism" or "Communism," if I may use the words in this connection, and it is to the claims of each of these parties to which I wish to call attention.

Individualism demands that each contract shall be considered as the unit of value. Communism throws the interests of all together, making a unit of all the individual interests. Individualism claims that each contract has certain inherent interests in all the assets of the company, apart from all the other contracts. Communism asserts that the interest of the whole mass of contracts, taken collectively, must first be considered, and that the individual, unable to carry out his contract alone, has given over to the company all his obligations and interests, except those guaranteed under its contract. Individualism says that any acknowledgment of the necessity of this machinery is confession of weakness; that a company should be able to close its books to all new entrants, and to pay all the claims of its present members, distributing to each policy-holder his equitable share of the surplus. Communism asserts that failure to acknowledge the necessity of this machine is the ignoring of the very element which makes life insurance a science and not a gamble; and that no individual policy-holder has any *inherent right* to any part of the assets of the company which is not specifically guaranteed in his contract.

In placing the company ahead of the individual, Communism is only giving due weight to a necessary element in the science of life contingencies where certainty is gained only through a large aggregation of risks. The company is the means by which this necessary element is conserved. It is a commercial body whose sole duty is to sell its contracts in the open market, where it must pay commissions which are dictated not by scientific principles, but by the struggle of humanity for existence. And it must faithfully keep these contracts, a duty which entails an expense that is governed more or less by the same condition. This is accomplished not so much by science as by art; and while all art is based on science, individual judgment, selection, and execution make it good or bad, a success or failure.

If, then, the existence of the company is a necessity, and this company has duties and responsibilities which cannot be circum-

scribed by formulæ, but must be carried out by the laws of commerce as well as by the science of life contingencies, it is neither science nor justice to ignore these facts. I do not in the least belittle the attempt to find a scientific expression for the value of a contract to a company, and the consequent loss it entails upon the company by its withdrawal. Nor do I ignore the benefit to the science resulting from any endeavor to crystallize into an algebraic formula any of the relations existing between individual contracts and the company of which they are a part. The successful conduct of life insurance demands the solution as far as possible of all such problems. But when all the varying relations and values of the numberless contracts are crystallized into formulæ, we still face the fact that the company's welfare is necessary for the safety of the individual contract, and that the company's conduct cannot be dictated by anything but the law of honest individual judgment based on a thorough knowledge of the science.

The deductions I would draw are plain: expense is not an element of an insurance contract so constant that it can enter as a factor in all algebraic formulæ for premiums or for the reserve of policies: that the company and the company alone has the legal and moral right of deciding how much of its earnings it shall expend for extending and caring for its business, and also from what sources it shall appropriate the gains to meet these expenses: that the expenses of a company should be charged to the various sources of profit on scientific principles adjusted to the needs of the individual company, and the divisible surplus remaining apportioned to the policy-holders by the well-known contribution formula and its modifications: and, finally, I can find no moral right for the dictation of legislation in the terms on which contracts may be broken. If the State must still exercise some restraining influence in the conduct of life insurance companies for the benefit of the public, honestly conducted companies should not be made to suffer by laws which are dictated by neither science nor commercial advantage.

An Equitable Method of Determining Paid-up or Cash Surrender Values.

DAVID PARKS FACKLER.

IN an address presented at the convention of Insurance Commissioners at Milwaukee last month, I outlined a method of determining minimum paid-up or cash surrender values safely and logically, if such were enacted by law. As that paper was rather popular in character, it was suggested to me that it might be well to prepare a memorandum for the Society, giving a more full and technical statement of methods for computing ordinary equitable paid-up or cash surrender values for the use of companies.

All of us must have experienced the difficulty of fixing upon any rule for determining paid-up or cash values from the ordinary reserves, that will give logical and consistent results for all forms of policies, life or endowment, and for all terms of a policy's existence. The percentage which may seem reasonable for an ordinary life policy after it has been five years in force, may be very unfair after it has been fifty years in force. The percentage which it may be fair to allow on an ordinary life policy may be quite inequitable when applied to a limited-payment life, particularly one with a short term of payments, and any percentage which may be reasonable in the earlier years of an endowment policy becomes more and more unreasonable with each year of the policy's existence thereafter. A consideration of all these difficulties led the writer many years ago to the belief that the following method would logically meet all the difficulties of the case.

Firstly, to meet the point that the retiring policy-holder is a better risk than the average of those remaining in the company, we have only to assume that he belongs to a class having some definite low rate of mortality, and that the corresponding single premium for the amount insured is the measure of the risk from which the company is relieved by his retiring. To measure the loss from the discontinuance of his premiums, we can deduct from his annual payment the portion of the margin which very certainly would be returned to him as a dividend. If we then find the value of an annuity for the balance of his premium according to the life table upon which we valued the company's liability

to him, and then take the difference between that amount and the company's liability as before estimated, we have the amount which the company can properly place to his credit for the purchase of paid-up insurance, which they can allow him upon the same basis that they computed their liability to him. These computations can be made on a moderate rate of interest, such as four per cent.

This rule, like all general rules, may require some limitation—thus, it might be found in the case of policies for the whole of life upon the lives of young men, that the resultant "paid-up" would be less than it was considered expedient to allow. The favorable rate of interest assumed, and the continuous lower rate of mortality in the case of a young man, may be more than can fairly be predicated for a period twenty-five or thirty years after the termination of the policy, and it might therefore be considered better in such cases not to let the paid-up value be less than what would be purchased on ordinary mortality tables by some fixed percentage of the ordinary reserves, or, to state it differently, that the "paid-ups" to be allowed should be such that they would never have an ordinary reserve value less than a certain percentage of the ordinary reserve value for the original policy. In some companies, or for some policies, it may also be necessary to assume that there is a fixed cost of collection from which the company would be relieved on the discontinuance of the premiums.

The subject of equitable cash surrender values may be more positively interesting to many of the companies, than that of "paid-ups," inasmuch as policy-holders sometimes institute lawsuits when dissatisfied with the cash surrender values stated to them by the companies. In such cases, it is extremely desirable to be able to show in court that the method of determining the cash value is as far as possible free from arbitrary elements and based on logical and defensible principles. For these reasons, the deductions of arbitrary percentages from statutory reserves will always be difficult to justify in court, and the writer believes that the following method will appeal to the common sense both of judge and jury.

In general, it will be better to take the paid-up policy that would be allowed as the basis of the calculation of the cash value of the original policy, as that is practically the only way to insure consistency between the two allowances. If, then, the paid-up policy that will be allowed has been determined, we proceed to find its cash value on the general principles outlined above, but in this

case, as the insured would give up all insurance and wholly withdraw from the company, it is reasonable to assume that he belongs to a class of lives having even a lower rate of mortality than then prevails among those that take paid-up policies. Taking the single premium for the paid-up policy according to such a table of mortality, with a reasonable rate of interest, we obtain evidently an equitable cash surrender value as the equivalent for the paid-up policy, and consequently for the original policy.

For the computation of paid-up policies and surrender values in accordance with these methods, the writer many years ago prepared tables having a rate of mortality based on various percentages of the Actuaries' Table of Mortality with various percentages of interest, and he and several other actuaries have found them very useful and satisfactory in determining surrender value allowances.

The above holds good in all cases when surrender values are asked in ordinary times when there is no difficulty in converting securities into cash at fair prices. Should the case be otherwise, however, in times of financial depression, it would, of course, be proper to make a deduction from the ordinary cash value to correspond with the loss that would be experienced in converting securities into cash in order to obtain the money to pay the cash surrender value.

It is quite probable that something similar to the above may be found in the Journal of the English Institute, but nothing of the kind has been seen or heard of by the writer.

Select Life Tables as the Basis of Premium Rates.

THOMAS BRADSHAW.

[These tables were inadvertently omitted from the article which appears on pp. 225-238, Vol. V. They are referred to on pp. 231-233.]

Table I.

H^M { Comparison of Premiums for Whole Life Insurance, according to Sprague's Select Life Table and the Institute of Actuaries' Mixed Life Table. } 3½%

Age.	10 Payment Life.			15 Payment Life.			20 Payment Life.			25 Payment Life.			30 Payment Life.			Whole Life.		
	10 $P_{[x]}$	10 P_x	Difference.	15 $P_{[x]}$	15 P_x	Difference.	20 $P_{[x]}$	20 P_x	Difference.	25 $P_{[x]}$	25 P_x	Difference.	30 $P_{[x]}$	30 P_x	Difference.	$P_{[x]}$	P_x	Difference.
20	36.54	33.72	+2.82	26.93	24.72	+2.21	22.25	20.34	+1.91	19.54	17.82	+1.72	17.82	16.22	+1.60	14.71	13.30	+1.41
25	38.52	37.13	1.39	28.39	27.28	1.11	23.47	22.50	.97	20.64	19.75	.89	18.88	18.03	.85	16.00	15.21	.79
30	41.89	41.31	.58	30 92	30.43	.49	25.62	25.17	.45	22.62	22.18	.44	20.77	20.34	.43	18.14	17.69	.45
35	46.06	46.00	.06	34.10	34.00	.10	28.39	28.25	.14	25.20	25.03	.17	23.29	23.10	.19	21.00	20.76	.24
40	51.05	51.34	−.29	38.05	38.17	−.12	31.90	31.93	−.03	28.54	28.52	.02	26.63	26.57	.06	24.77	24.65	.12
45	57.05	57.78	.73	42.88	43.33	.45	36.32	36.62	.30	32.89	33.11	−.22	31.06	31.24	−.18	29.74	29.85	−.11
50	63.91	65.27	1.36	48.67	49.59	.92	41.85	42.57	.72	38.50	39.12	.62				36.18	36.67	.49
55	72.31	74.30	1.99	56.17	57.61	1.44	49.31	50.52	1.21							44.93	45.88	.95
60	82.64	85.57	2.93													56.81	58.48	1.67
65																72.83	75.64	2.81

THOMAS BRADSHAW.

[These tables were inadvertently omitted from the article which appears on pp. 225-238, Vol. V. They are referred to on pp. 231-233.]

TABLE II.

H^M { COMPARISON OF PREMIUMS FOR ENDOWMENT INSURANCE, ACCORDING TO SPRAGUE'S SELECT LIFE TABLE AND THE INSTITUTE OF ACTUARIES' MIXED LIFE TABLE. } $3\frac{1}{2}\%$

AGE.	10-YEAR ENDOWMENT.			15-YEAR ENDOWMENT.			20-YEAR ENDOWMENT.			25-YEAR ENDOWMENT.			30-YEAR ENDOWMENT.		
	$P_{[x]:\overline{10}]}$	$P_{x:\overline{10}]}$	Difference.	$P_{[x]:\overline{15}]}$	$P_{x:\overline{15}]}$	Difference.	$P_{[x]:\overline{20}]}$	$P_{x:\overline{20}]}$	Difference.	$P_{[x]:\overline{25}]}$	$P_{x:\overline{25}]}$	Difference.	$P_{[x]:\overline{30}]}$	$P_{x:\overline{30}]}$	Difference.
20	86.70	85.66	+1.04	55.00	53.77	+1.23	39.56	38.26	+1.30	30.62	29.31	+1.31	24.96	23.64	+1.32
25	86.10	85.88	.22	54.58	54.12	.46	39.24	38.70	.54	30.44	29.85	.59	24.95	24.31	.64
30	86.16	86.46	−.30	54.74	54.79	−.05	39.56	39.47	.09	30.96	30 76	.20	25.68	25.40	.28
35	86.43	87.12	.69	55.21	55.58	.37	40 30	40.46	−.16	31.97	31.99	−.02	26.99	26.92	.07
40	86.93	87.94	1.01	56.18	56.70	.52	41.63	41.90	.27	33.69	33.81	.12	29.17	29.20	−.03
45	88.11	89.43	1.32	57.83	58.59	.76	43.81	44.29	.48	36.47	36.80	.33	32.57	32.81	.24
50	89.84	91.65	1.81	60.35	61.50	1.15	47.16	48.02	.86						
55	92.92	95.25	2.33	64.63	66.26	1.63									
60	98.02	101.23	3.21												

Select Life Tables as the Basis of Premium Rates.—*Continued.*

THOMAS BRADSHAW.

[These tables were inadvertently omitted from the article which appears on pp. 225-238, Vol. V. They are referred to on pp. 231-233.]

Table III.

H^M { Comparison of Premiums for Endowment Insurance by 10 Payments, according to Sprague's Select Life Table and the Institute of Actuaries' Mixed Life Tables. } 3½%

Age.	15-Year Endowment.			20-Year Endowment.			25-Year Endowment.			30-Year Endowment.		
	$10\,P_{[x]:\overline{15}|}$	$10\,P_{x:\overline{15}|}$	Difference.	$10\,P_{[x]:\overline{20}|}$	$10\,P_{x:\overline{20}|}$	Difference.	$10\,P_{[x]:\overline{25}|}$	$10\,P_{x:\overline{25}|}$	Difference.	$10\,P_{[x]:\overline{30}|}$	$10\,P_{x:\overline{30}|}$	Difference.
20	74.63	73.35	+1.28	64.98	63.42	+1.56	57.27	55.47	+1.80	51.18	49.16	+2.02
25	74.04	73.66	.38	64.41	63.88	.53	56.81	56.12	.69	50.92	50.06	.86
30	74.16	74.37	−.21	64.68	64.78	−.10	57.34	57.29	.05	51.78	51.59	.19
35	74.57	75.19	.62	65.39	65.88	.49	58.43	58.79	−.36	53.38	53.60	−.22
40	75.38	76.27	.89	66.62	67.38	.76	60.26	60.88	.62	55.92	56.42	.50
45	76.93	78.15	1.22	68.81	69.89	1.08	63.27	64.23	.96	59.81	60.70	.89
50	79.25	80.96	1.71	72.02	73.62	1.60						
55	83.20	85.45	2.25									

THOMAS BRADSHAW.

[These tables were inadvertently omitted from the article which appears on pp. 225-238, Vol. V. They are referred to on pp. 231-233.]

TABLE IV.

H^M { COMPARISON OF PREMIUMS FOR SINGLE PAYMENT LIFE AND ENDOWMENT INSURANCES, ACCORDING TO SPRAGUE'S SELECT LIFE TABLE AND THE INSTITUTE OF ACTUARIES' MIXED LIFE TABLES. } $3\frac{1}{2}\%$

AGE.	10-YEAR ENDOWMENT.			15-YEAR ENDOWMENT.			20-YEAR ENDOWMENT.			25-YEAR ENDOWMENT.			30-YEAR ENDOWMENT.			WHOLE LIFE.		
	$A_{[x]:\overline{10}\rceil}$	$A_{x:\overline{10}\rceil}$	Difference.	$A_{[x]:\overline{15}\rceil}$	$A_{x:\overline{15}\rceil}$	Difference.	$A_{[x]:\overline{20}\rceil}$	$A_{x:\overline{20}\rceil}$	Difference.	$A_{[x]:\overline{25}\rceil}$	$A_{x:\overline{25}\rceil}$	Difference.	$A_{[x]:\overline{30}\rceil}$	$A_{x:\overline{30}\rceil}$	Difference.	$A_{[x]}$	A_x	Difference.
20	719.41	716.96	+2.45	619.26	613.92	+5.34	539.14	530.81	+8.33	475.19	464.26	+10.93	424.65	411.45	+13.20	303.18	282.26	+20.92
25	718.01	717.48	.53	617.43	615.43	2.00	537.14	533.70	3.44	473.70	468.84	4.86	424 58	418.25	6.33	321.22	310.19	11.03
30	718.13	718.85	—.72	618.13	618.33	—.20	539.11	538.56	.55	477.93	476.33	1.60	431.60	428.94	2.66	349.17	343.43	5.74
35	718.78	720.39	1.61	620.15	621.71	1.56	543.77	544.73	—.96	485.94	486.11	—.17	443.91	443.22	.69	383.05	380.33	2.72
40	719.95	722.26	2.31	624.23	626.39	2.16	551.76	553.38	1.62	499.08	499 98	.90	463.12	463.35	—.23	422.81	421.65	1.16
45	722.64	725.63	2.99	631.00	634.06	3.06	564.38	567.07	2.69	518.91	521.14	2.23	490.58	492.45	1.87	467.93	468.84	—.91
50	726.52	730.47	3.95	640.87	645.24	4.37	582.40	586.79	4.39							516.85	520.23	3.38
55	733.17	737.99	4.82	656.49	662.08	5.59										570.54	575.66	5.12
60	743.50	749.59	6.09													626.85	633.61	6.76

Modification of Mr. McClintock's Formula for an Approximation of Accumulated Contribution to Surplus.

GARDNER LADD PLUMLEY.

IN Vol. 1, No. 4, of the Papers and Transactions of the Society, Mr. McClintock gave a number of valuable and very interesting formulæ for ascertaining contribution to surplus. Among these formulæ is the following for the approximation to the accumulated contribution for a series of years. For the equivalents of g, L, r and i in the formulæ, the reader is referred to Mr. McClintock's paper.

$$Sum = L_5 + g_2 V_2 + g_5 V_5 \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad 9$$

To obtain this formula Mr. McClintock makes the assumption that the values $V_1 \ldots\ldots V_n$ form an arithmetical series.

If a greater degree of accuracy is desired, the modification which is naturally suggested is to assume that the first or higher differences of $V_1 \ldots\ldots V_n$ are an arithmetical series.

Mr. McClintock's general formula from which (9) was obtained is:

$$Sum = L_n + r_1 V_1 + r_2 V_2 \ldots\ldots + r_n V_n + i_n V_{n+1} \quad \ldots\ldots \quad 7$$

The last term, $i_n V_{n+1}$, disappears if the policy has been just n years in force.

Expressing the values $V_1, V_2 \ldots\ldots V_n$ in terms of V_n and its differences, assuming the third difference to be 0, we have:

$$V_n = V_n$$

$$V_{n-1} = V_n + \Delta V_n$$

$$V_{n-2} = V_n + 2\Delta V_n + \Delta^2 V_n$$

. . . . . .

. . . . . .

$$V_2 = V_n + (n-2)\Delta V_n + \frac{(n-2)(n-3)}{2}\Delta^2 V_n$$

$$V_1 = V_n + (n-1)\Delta V_n + \frac{(n-1)(n-2)}{2}\Delta^2 V_n$$

Substituting these values of V_n, V_{n-1}..... V_1 in (7)

$$\Sigma = L_n + r_1\left[V_n + (n-2)\Delta V_n + \frac{(n-1)(n-2)}{2}\Delta^2 V_n\right]$$
$$+ r_2\left[V_n + (n-2)\Delta V_n + \frac{(n-2)(n-3)}{2}\Delta^2 V_n\right] \quad \ldots\ldots \quad 1$$
$$+ \ldots\ldots \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots$$
$$+ \ldots\ldots \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots$$
$$+ r_n V_n$$

Grouping the coëfficients of V_n, ΔV_n and $\Delta^2 V_n$

$$\Sigma = L_n + V_n(r_1 + r_2 + r_3 \ldots\ldots r_n)$$
$$+ \Delta V_n\left[(n-1)r_1 + (n-2)r_2 \ldots\ldots 2r_{n-2} + r_{n-1}\right] \quad \ldots \quad 2$$
$$+ \Delta^2 V_n\left[\frac{(n-1)(n-2)}{2}r_1 + \frac{(n-2)(n-3)}{2}r_2 \ldots\ldots r_{n-2}\right]$$

Let

$$r_1 + r_2 \ldots\ldots r_n = a$$
$$(n-1)r_1 + (n-2)r_2 \ldots\ldots r_{n-1} = b$$
$$\frac{(n-1)(n-2)}{2}r_1 + \frac{(n-2)(n-3)}{2}r_2 \ldots\ldots r_{n-2} = c$$

where r is constant for all policies whatsoever which have been n years in force. Substitute a, b and c in (2) and we have, finally,

$$\Sigma = L_n + aV_n + b\Delta V_n + c\Delta^2 V_n \quad \ldots\ldots\ldots\ldots \quad 3$$

Market Value of $100 Government 3 per cent. Bond. Issue of August 1, 1898.

Interest paid quarterly. Samuel S. Hall.

Years to Run.	10	9¾	9½	9¼	9	8¾	8½	8¼	8	7¾
To Realize										
2 %	109.04	108.84	108.63	108.43	108.22	108.01	107.80	107.59	107.38	107.16
2.10	108.10	107.91	107.73	107.54	107.36	107.18	106.99	106.80	106.61	106.42
2.20	107.17	107.00	106.84	106.67	106.51	106.35	106.19	106.02	105.85	105.69
2.30	106.24	106.10	105.96	105.81	105.67	105.53	105.39	105.25	105.10	104.96
2.40	105.32	105.20	105.09	104.96	104.84	104.72	104.60	104.48	104.36	104.23
2.50	104.41	104.32	104.22	104.12	104.02	103.92	103.82	103.72	103.62	103.51
2.60	103.51	103.44	103.37	103.29	103.20	103.12	103.05	102.97	102.89	102.80
2.70	102.62	102.57	102.52	102.46	102.39	102.33	102.28	102.22	102.16	102.09
2.80	101.74	101.71	101.68	101.64	101.59	101.55	101.52	101.48	101.44	101.39
2.90	100.87	100.85	100.84	100.82	100.80	100.78	100.76	100.74	100 72	100.70
3.	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Years to Run.	7½	7¼	7	6¾	6½	6¼	6	5¾	5½	5¼
To Realize										
2 %	106.95	106.73	106.52	106.30	106.08	105.86	105.64	105.42	105.20	104.97
2.10	106.23	106.03	105.85	105.65	105.45	105.26	105.06	104.86	104.67	104.46
2.20	105.52	105.34	105.18	105.01	104.83	104.66	104.49	104.31	104.14	103.95
2.30	104.81	104.66	104.52	104.37	104.21	104.06	103.92	103.76	103.61	103.44
2.40	104.11	103.98	103.86	103.73	103.60	103.47	103.35	103.21	103.08	102.94
2.50	103.41	103.31	103.20	103.10	102.99	102.88	102.78	102.67	102.56	102.45
2.60	102.72	102.64	102.55	102 47	102.39	102.30	102.22	102.13	102.05	101.96
2.70	102.03	101.97	101.91	101.85	101.79	101.72	101.66	101.59	101.53	101.47
2.80	101.35	101.31	101.27	101.23	101.19	101.15	101.11	101.06	101.02	100.98
2.90	100.68	100.66	100.64	100.62	100.60	100.58	100.56	100.53	100.51	100.49
3.	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100 00	100.00

Years to Run.	5	4¾	4½	4¼	4	3¾	3½	3¼	3	2¾
To Realize										
2 %	104.75	104.52	104.29	104.06	103.83	103.60	103.37	103.14	102.90	102.67
2.10	104.26	104.05	103.85	103.64	103.44	103 23	103.02	102.82	102.60	102.39
2.20	103.78	103.59	103.41	103.23	103.05	102.86	102.68	102.50	102.31	102.12
2.30	103.30	103.13	102.98	102.82	102.66	102.50	102.34	102.18	102.02	101.85
2.40	102.82	102.68	102.55	102.41	102.28	102.14	102.00	101.87	101.73	101.58
2.50	102.34	102.23	102.12	102.01	101.90	101.78	101.67	101.56	101.44	101.32
2.60	101.87	101.78	101.70	101.61	101.52	101.42	101.33	101.24	101.15	101.05
2.70	101.40	101.33	101.27	101.20	101.14	101.07	101.00	100.93	100.86	100.79
2.80	100.94	100.89	100.85	100.80	100.76	100 71	100.66	100.62	100.57	100.52
2.90	100.47	100.45	100.43	100.40	100.38	100.35	100.33	100.31	100.29	100.26
3.	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Years to Run.	2½	2¼	2	1¾	1½	1¼	1	¾	½	¼
To Realize										
2 %	102.43	102.19	101.96	101.72	101.47	101.23	100.99	100.74	100.50	100.25
2.10	102.18	101.97	101.76	101.54	101.32	101.10	100.89	100.66	100.45	100.22
2.20	101.93	101.75	101.56	101.36	101.17	100.97	100.79	100.58	100.40	100.19
2.30	101.69	101.53	101.36	101.19	101.02	100.85	100.69	100.51	100.35	100.16
2.40	101.45	101.31	101.16	101.02	100.87	100.73	100.59	100.44	100.30	100.14
2.50	101.21	101.09	100.97	100.85	100.73	100.61	100.49	100.37	100.25	100.12
2.60	100.96	100.87	100.77	100.68	100.58	100.48	100.39	100.29	100.20	100.10
2.70	100.72	100.65	100.58	100.51	100.44	100.36	100.29	100.22	100.15	100.07
2.80	100.48	100.43	100.39	100.34	100.29	100.24	100.20	100.15	100.10	100.05
2.90	100.24	100.21	100.19	100.17	100.15	100.12	100.10	100.07	100 05	100.02
3.	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Valuation of Reversionary Annuities by C Columns.

MAXIMILIAN H. PEILER.

AT the request of the editor the following examples and formulæ are submitted :

Net single premium to provide for t annual instalments of $1 each, payable in the event of x's death, and for a life annuity of $1 to y if y survive x by t years,

$$= A_x \frac{1+i-v^{t-1}}{i} + A'^{1}_{\overline{x.y}},$$

$$\text{where } A'^{1}_{\overline{x.y}} = \frac{D_{y+t}}{D_y}(a_{y+t} - a_{x.y+t}).$$

The latter expression may be found in formula 16, p. 282, Meech's System and Tables.

$$\text{Annual Premium} = P_x \frac{1+i-v^{t-1}}{i} + \frac{A'^{1}_{\overline{x.y}}}{1+a_{x.y}}.$$

The first part of the premiums purchases the required insurance of t instalments certain, the first payable at the end of year of x's death, the last $t-1$ years from the year of x's death.

The second part may be obtained by summing the present values of the future annual costs :

$$A'^{1}_{\overline{x.y}} = \Sigma \frac{v^{t+n}}{l_x} \frac{d_{x+n-1}}{l_y} \frac{l_{y+t+n}}{D_{y+t+n}} \frac{N_{y+t+n}}{} = \Sigma \frac{d_{x+n-1}}{v^y} \frac{N_{y+t+n}}{l_x \, l_y} =$$

$$\Sigma \frac{(l_{x+n-1} - l_{x+n})}{v^y} \frac{N^{y+t+n}}{l_x \, l_y} = \frac{D_{y+t}}{D_y}(a_{y+t} - a_{x.y+t}).$$

The first annual cost included in the summation is that which provides for the annuity at the age $y+t+1$ for, by virtue of the payment of $A_x \frac{1+i-v^{t-1}}{i}$, if x dies during the first year of the contract y, surviving, is provided with t instalments certain at the ages $y+1, y+2$, etc., the last at age $y+t$.

For the construction of tables of the required survivorship values it has been found convenient to employ summations of prod-

ucts analogous to the commutation columns for survivorship insurances. The following is one of a suitable form :

$$\Sigma\, C_{x+n-1}\,(1+i)^{y+n}\,N_{y+t+n}.$$

Denoting these summations by $M'_{\overline{1}\,\overline{x.y}}$ the single and annual premiums become :

$$A'_{\overline{1}\,\overline{x.y}} = \frac{M'_{\overline{1}\,\overline{x.y}}}{D_{x.y}} \text{ and } P'_{\overline{1}\,\overline{x.y}} = \frac{M'_{\overline{1}\,\overline{x.y}}}{N_{x.y}}.$$

This method permits of the introduction of different rates of mortality and interest, for the insurance period and for the annuity period, and makes possible the determination of the amount of annual net premium just sufficient to prevent negative results in valuation.

TABLE I.

ILLUSTRATING VALUATION OF REVERSIONARY ANNUITIES BY C COLUMNS.

EXAMPLE : Annual net premium, payable during the joint existence of x and y within 5 years, to purchase a life annuity of \$100 to y if x predeceases within 5 years. $100\,{}^{5}P'_{\overline{x.y}\,1} = 100\,\dfrac{M'_{x.y} - M'_{x+5.y+5}}{N_{x.y} - N_{x+5.y+5}}$;*

$${}_nV' = ({}_{n-1}V' + P' - {}_{n-1}c')\,\frac{{}_{n-1}D'}{{}_nD}.$$

x=50, Meech Table, Males ; y=40, Farr's Healthy Districts, Females ; rate of interest for insurance period= 4% ; for annuity period=3½%.

n	C_{x+n-1}(4%)	N_{y+n}(3½%)	$C_{x+n-1}(1+i)^{y+n}\,N_{y+n} = C'_{x+n-1.y+n-1}$	$D_{x+n-1}\,l_{y+n-1}$ (4%) $= D_{x+n-1.y+n-1}$	100 $(1+a_{y+n})$= Amount Insured.	$100 \times \dfrac{C'_{x+n-1.y+n-1}}{D_{x+n-1.y+n-1}} = 100\,{}_{n-1}c'$ = Annual Advance Cost.	Reserve, 4%.	n
1	137,736	133,972,628	75,616,728.	314,796,500.	1,780.44	24.0208	2.12	1
2	137,773	126,447,921	73,887,420.	295,410,401.	1,757.09	25.0118	3.34	2
3	137,978	119,251,471	72,228,505.	276,959,985.	1,732.97	26.0790	3.49	3
4	138,324	112,370,138	70,619,371.	259,391,436.	1,708.11	27.2250	2.44	4
5	138,787	105,791,500	69,042,309.	242,655,042.	1,682.35	28.4529	0.	5
			361,394,333. $= M'_{x.y} - M'_{x+5.y+5}$	1,389,213,364. $= N_{x.y} - N_{x+5.y+5}$				

$D_{x+5.y+5}$ = 226,727,679. P' = 26.01431

* Single Premium (usual form)$= a_y - a_{x.y} - \dfrac{D_{x+5.y+5}}{D_{x.y}}\,(a_{y+5} - a_{x+5.y+5})$.

Table II.

Covering First Ten Years of a Life Contract, Illustrating Adjustment of Annual Premium for Reversionary Annuities by C Columns.

Annual net premium payable during the joint existence of x, aged 40, and y, aged 60, to purchase a ten-year temporary annuity of \$100 to y if x predeceases. Carlisle 3½%,

$$= 100 \times \left[a_y - a_{x.y} - \frac{D_{y\,|\,10}}{D_y} (a_{y\,|\,10} - a_{x.y\,|\,10}) \right] \div (1 + a_{x.y}) = \$9.2563.$$ (For Commutation Columns, see Chisholm, Vol. I.)

$x+n-1.y+n-1$	$N_{y+n} - N_{y\,|\,n+10}$	$C_{x+n-1}(1+i)^{x+n}(N_{y\,|\,n} - N_{y+n\,|\,10})$ $= C'_{x\,|\,n-1.y\,|\,n-1}$ conforming with Chisholm's Joint Life Tables.	$M'_{x.y} - M'_{x\,|\,n.y\,|\,n}$	$100 \times \frac{C'_{x+n-1.y+n-1}}{D_{x+n-1.y\,|\,n-1}}$ =Annual Advance Cost per \$100.	Year.
40.60	3,160.2487	208,576.41	208,576.41	8.8877	1
41.61	2,926.3962	201,921.36	410 497.77	9.3353	2
42.62	2,704.1257	191,992.94	602,490.71	9.6610	3
43.63	2,492.0618	176,936.34	779,427.05	9.7126	4
44.64	2,288.7630	162,502.21	941,929.26	9.7418	5
45.65	2,093.1213	146,518.48	1,088,447.74	9.6097	6
46.66	1,905.1872	131,457.94	1,219,905.68	9.4459	7
47.67	1,724.8465	115,564.70	1,335,470.38	9.1111	8
48.68	1,552.4837	97,806.51	1,433,276.89	8.4754	9
49.69	1,388.6899	84,710.12	1,517,987.01	8.0801	10

Adjustment of annual premium: The maximum cost, 9.7418, is that of the fifth year;

$100 \times \frac{M'_{x.y} - M'_{x+5.y+5}}{N_{x.y} - N_{x+5.y+5}} = 100 \times \frac{941,929.26}{9,986,906.3} = 9.4316$, is less than the cost of the next subsequent year:

hence, $100 \frac{M'_{x.y} - M'_{x+6.y+6}}{N_{x.y} - N_{x+6.y+6}} = 100 \times \frac{1,088,447.74}{11,511,598.2} = 9.4555$, accumulated by the retrospective method, gives a reserve at the end of the sixth year equal to zero and maintains reserves positive for subsequent years.

Abstract of the Discussion of Papers Read at Previous Meetings.

PROVISION FOR AND DISTRIBUTION OF EXPENSES. WILLIAM D. WHITING.
PAGE 214, VOL. V.

MR. WHITING: It has been suggested by some, to whom the propositions appearing in my paper read at the April meeting, on distribution of expenses, seemed confused, that a recapitulation with formulæ would be desirable.

The propositions were, that the several independent kinds of expenses which we have to provide for are reducible to five forms:

$^{1}\varepsilon$=first year—payable out of first year's premium.
$^{2}\varepsilon$=renewal—payable out of renewal premium.
$^{3}\varepsilon$=settlement—payable out of interest receipts.
$^{4}\varepsilon$=investment—payable out of interest receipts.
$^{5}\varepsilon$=general—payable out of mortality gains.

Also, that the gains derived from lapses and surrenders are distributable to the extent of meeting the damage inflicted by withdrawal as a *mortality* credit; and to the extent (over and above this) of producing a profit as an *interest* credit. These are designated respectively as ^{1}g and ^{2}g.

From this arrangement it is clear that the *net* ordinary whole life premium would, on a three per cent. basis, become $\frac{M_{x+1}}{N_{x+1}} \times 1.03$ in order to permit the use of the whole first year's premium for first year's expenses ($^{1}\varepsilon$) and mortality, by converting the first year into one year preliminary term insurance having no terminal reserve. The limited payment whole life *net* premium would become $\frac{M_{x+1}}{N_{x+1}-N_{x+n}} \times 1.03$, and the ordinary endowment *net* premium $\frac{(M_{x+1}-M_{x+n})\,1.03+D_{x+n}}{N_{x+1}-N_{x+n}}$. The multiplication by 1.03 to release costs of insurance (K) at the beginning, instead of end, of the policy year and provide for immediate settlement of death claims and for settlement expenses ($^{3}\varepsilon$) would, of course, become unnecessary when commutation column $C_x = d_x v^x$ instead of $d_x v^{x+1}$, as suggested in the original paper.

The loading or margin, added to *every* net premium, would be uniform for all ages of entry, and about ten per cent. for the purpose of covering ${}^{2}\varepsilon$. Investment expenses (${}^{4}\varepsilon$) are taken care of by excess interest earned over three per cent.; and general expenses (${}^{5}\varepsilon$) by the excess mortality (K) imposed by either Actuaries (17 Offices) or American (Homans') tables of mortality now in general use, and which are easily ten per cent. higher than actual experience *after* first year. The office premiums (P) thus obtained will not, on an average, exceed those current with United States companies.

The application of above distribution of expenses and secession gains to a division of profits would be equally simple. The formula for first year's dividend becomes $[P-{}^{1}\varepsilon-(S-I_x)(q^{1}{}_{x}+{}^{5}\varepsilon)]\times(1+i^{1}-{}^{3}\varepsilon-{}^{4}\varepsilon)=$Dividend, in which q^{1} and i^{1} respectively represent the actual experience in mortality and interest, and I_x the *initial* reserve. Owing to the large amount of ${}^{1}\varepsilon$ in nearly all companies, the first year's dividend is *nil*. The formula for renewal years, making l=loading on net premium, becomes

$$[{}_{n}I_x+l-{}^{2}\varepsilon-(S-{}_{n}I_x)\times(q^{1}{}_{x-n}+{}^{5}\varepsilon-{}^{1}g)]\times(1+i^{1}+{}^{2}g-{}^{3}\varepsilon-{}^{4}\varepsilon)-{}_{n+1}V_x$$
$$=\text{Dividend.}$$

As ${}_{n+1}V_x={}_{n}I_x\times 1.03-(S-{}_{n}I_x)q_{x+n}\times 1.03$ we have by writing $q^{0}{}_{x-n}$ for $q^{1}{}_{x+n}+{}^{5}\varepsilon-{}^{1}g$, and 1.01^{0} for $1+i^{1}+{}^{2}g-{}^{3}\varepsilon-{}^{4}\varepsilon$, and substituting

$$(l-{}^{2}\varepsilon)\,1.01^{0}+{}_{n}I_x\times(.01^{0}-.03)+(S-{}_{n}I_x)\times(q_{x-n}\times 1.03-q^{0}{}_{x-n}\times 1.01^{0}).$$

For practical computations the first term, having only a nominal value, may be neglected, and the working formula would be ${}_{n}I_x[(.01^{0}-.03)-(q_{x-n}\times 1.03-q^{0}{}_{x-n}\times 1.01^{0})]+S\times(q_{x-n}\times 1.03-q^{0}{}_{x-n}\times 1.01^{0})$, which, by tabulating the recurrent factor, becomes more simple than the contribution formula in common use.

Mr. Nichols: Mr. Whiting has attempted in his paper to align the distribution of expenses with the distribution of dividends; and in doing so, I think he has struck the key to the principle involved in the solution of the expense problem. It is an ordinary rule of law that partners are presumed to share losses in the same proportion that they share profits. In discussing the parties who were obligated to contribute to the assets in the winding up of the Albion Life, 16 Ch., D. 83, pp. 89, 92, the British Chancery Court recognized this legal presumption, but held it to be inapplicable because the profits in that case were carried to a fund that was accumulated

for the benefit of both participating and non-participating members, and there was no way of determining how those profits would be shared. Where no such considerations complicate the problem, however, it is laid down by Crowley, the English text writer, as the only fair and correct legal principle that policy-holders should contribute on the basis of profit sharing. (Crowley on Life Ins., p. 2610.)

It may be objected to this statement that in a purely mutual life company there is no such thing as profits. The dividends are simply the return of overpayments. Strictly speaking this is true, but for the purpose of this discussion the principle involved in dividend sharing is essentially the same as in profit sharing.

The element of mutuality in a company legally subsists by virtue of the relations of the members as dividend sharers, not as policy-holders. This distinction is implicitly recognized by our own courts in litigations between a company and its members. The former is treated as regards its contract of insurance as an entity, having no other relations to the policy-holder than that of debtor and creditor. It is only when we come to the contribution of premiums, and the apportionment of expenses and surplus, that we find the partnership features of the relation emphasized. The members of a mutual company, says Judge May, are, in point of fact, stockholders. "The stock is usually taken by paying in a certain amount of cash premium, and the balance in what are denominated premium notes." (May on Ins., 549.)

Again, he says, "It is the party contracting for insurance and paying the premium who is the member of a mutual company, not the party entitled to the payment of the loss." (May on Ins., 552.) This point has been emphasized in attempts of tontine policy-holders to secure an accounting. In the case of Uhlmann vs. Insurance Company it was said by the Court of Appeals of New York that the relation between the policy-holder and the company, even when mutual, is simply one of contract, and the Supreme Court of Massachusetts, in Pierce vs. Assurance Society, declared that the holder of a tontine policy at the termination of the period is a creditor, and not a member. The English doctrine is decisively laid down by Crowley, p. 262, that a participating policy-holder is a member in virtue of his participation of profits, not in virtue of his holding a policy.

My specific point is that by virtue of his sharing in the dividends the member of a mutual company stands in substantially a

similar position to his fellow-members as does the ordinary member of a business firm to his fellow-partners, and the same presumption of law applies that the sharing of expenses should be determined by the sharing of profits; therefore, prima facie, a scheme which aligns the expenses with the dividends is the most consistent with equity.

This, however, is merely a legal presumption which may be overcome if the conditions render it inapplicable. Is there anything in the nature of the life insurance scheme which is inconsistent with this doctrine?

The contribution plan of surplus is, by common consent, the true principle on which so-called insurance profits should be distributed. It is simply return of overpayments in proportion as each member's payments have contributed to their production, or the return to him of whatever remains of his accumulated payments after charging him with the actual gross cost of his insurance and his share of the reserve. In the same way Mr. Whiting's scheme of assessing expenses proposes to charge the member in proportion as his individual insurance has contributed to the cost. He applies the same contribution principle to both dividends and expenses. He departs, however, from the ordinary application of the legal rule in one important respect. The assessment of expenses is not a fixed pro rata of the profit sharing, as would be the case in an ordinary business partnership. But this is just the point where the application of profit sharing in a mutual life company also departs from the ordinary business rule. The profits of the company are not shared on the basis of any fixed pro rata of the policy-holder's interest; they are controlled by the peculiar contract relations under which insurance is assumed to be furnished at cost. Mr. Whiting has logically extended the same idea of cost to the apportionment of expenses, and to make the analogy more complete has sought to align each element of expense with a corresponding element of profit.

It seems to me that the basic principle of Mr. Whiting is the correct one. Apart from any legal rule, if the mutual principle involved in insurance calls for a return of overpayments as the premiums of the policy-holders have contributed to their creation, it would seem equity required the expenses to be assessed as the policy-holder has contributed to produce them. If the contribution theory is correct in regard to dividends, it should, so far as practicable, apply to expenses.

THE APPLICATION OF THE DOCTRINE.

Whether Mr. Whiting has correctly applied the doctrine, however, is another question. *De minimis non curat lex*, is, I believe, a legal maxim applicable to the apportionment of insurance expenses. In all ordinary business the matter of expenses is a thing so complicated with general business features that its apportionment between partners is best measured by their respective interests without attempts at ultra refinement. In a limited measure the same feature inheres in life insurance. Originally the first year's business involved no excessive cost, there were no surrender values to be considered, nor was the banking element discriminated by our present system of net reserves, with its alleged equities of individual policy-holders enforced by law. All these are later growths. The contract was in all its features an essential unity involving chiefly the grant of whole life insurance. Under these circumstances no obvious inconsistency existed in dealing with expenses and dividends in the old English fashion, according to ordinary business methods. The contribution principle was a natural result of the changed conceptions of the business. Its application to overpayments was obvious because the source of those overpayments could be clearly traced. I apprehend that it was never applied to expenses because their source could not be so obviously defined, and the ultra refinements which seemed to be called for in the attempt, would be a practical violation of the legal maxim, "*de minimis*," referred to, and a setting aside of those ordinary business rules which call for practical simplicity in partnership adjustments.

Now, how far has Mr. Whiting overcome this difficulty? He sets forth five separate sources of surplus. The first is the initial expense of the first year attending the granting of the insurance. Modern business conditions have rendered this so distinct from all others and so sharply confined to a separate class that the propriety of its recognition seems obvious. When the conception of a uniform premium for all years was framed no such conditions existed. The yearly expenses were more nearly uniform. Practically the conditions governing this item are in line with those which call for initiation in clubs and benefit societies, and to ignore them would be a serious injustice to older members.

The simple and practical plan of meeting them, I believe, is through Mr. Whiting's second suggestion of term insurance for the first year. It was what I advocated at the International Congress

in London, and is in accord with the views of Mr. Homans, Dr. Sprague and other prominent actuaries. The conditions are there and cannot be removed. They have simply got to be met. If the company can put up the legal reserve needed by its contract during $x-1$ years, there is no sufficient reason why it should be compelled to advance from its own treasury a hypothetical sum during the first year.

I see no reason why Mr. Whiting's fourth item of investment expenses should not be charged against interest gains from investments so far and so long as such interest gains will meet them. Here, too, we meet with a distinct item which is more or less clearly separable from the rest and directly associated with an element which we recognize in the contribution formula. It deals with the banking feature, which in both law and practice has already been separated from the more strictly insurance elements.

The propriety of attempting to separate the remaining elements is not so clear to me. Setting aside entirely the first year's business, and the question of investments, it seems to me that, so far as the remaining policy-holders are concerned, items 2, 3 and 5 might all fall under a single heading of general expenses for the reasons noted, that the lines of separation are not sharply drawn, that the attempt to separate is an undue refinement opposed to the principle of practical simplicity which, if possible, should govern the apportionment.

The expenses of settlement are not a matter that specially concerns the members in proportion to their investment earnings. The premiums of all are loaded for this expense. If a special item at all, it is logically a function of the mortality element, and this would, perhaps, be the best method to deal with it. Instead of regarding the claim as the net amount called for by the contract, it may be properly treated as the gross amount, including both the interest on claims when payment has been deferred through unsuccessful litigation and expenses of all kinds involved in the settlement, and offset in a measure by such as are compromised. The excess of tabular above actual mortality is then a natural loading to meet just this element.

But the second item of collection expenses and the fifth, which includes all others, would properly seem to constitute a single class of general expenses to be assessed on all. In the case of limited payment policies item No. 2 takes care of itself, for when

the premium payments are completed the collection expense disappears.

We are thus, after the first year of insurance, reduced to three classes of expenses strictly in line with the contribution formula. General expenses are cared for by a deduction from the gains from loading, settlement expenses by a deduction from the mortality gains and investment expenses by a deduction from interest gains, the three sources of contribution to dividends. This leaves the contribution formula substantially in its present shape. All that is needed is to make the required deductions from each item.

I am well aware that in this abbreviated form some of the finer distinctions drawn by Mr. Whiting are ignored. But in dealing with a question like the distribution of expenses, it should be regarded from the objective standpoint of the member, rather than the subjective standpoint of the company's bookkeeper, who may desire to rigidly analyze every feature of the business for his own guidance and a clearer grasp of its condition.

Mr. Whiting's analysis may be more thorough, and in some respects in closer accord with a theoretical equity, but it suggests to me the gain and loss exhibit which, to an expert examiner like himself, may be of much service in judging of a company's true condition, but to many officers, and to nearly all policy-holders, is as unintelligible as a problem in the calculus. The ordinary policy-holder judges his company by the plain business showing of resources and obligations, not by the technical points brought out in the gain and loss exhibit. As a member and *quasi* partner in the company he wishes his profits and expenses assigned, if possible, according to the ordinary business methods within his comprehension. The courts, as a rule, favor this method within the bounds of substantial equity. If I remember correctly, one of the chief obstacles in the introduction of the contribution plan was the difficulty of making it intelligible to the policy-holders. I doubt whether one agent in ten could be made to comprehend the formula proposed by Mr. Whiting, which is a monument to the mathematical ingenuity and the keen analytical powers of that gentleman. As a testimonial to his ability as a mathematician and an analyzer of the theoretical equities of a life company, it is admirable. But the question here is as to its practical application. It involves the tabulation and use of a new factor, and the substitution of an initial for the time-honored terminal reserve. It involves, too, if I understand him, a recast of the premium on a

new basis. Is all this essential to doing substantial equity in the distribution of expenses, even granting that the scheme is theoretically perfect? That is the query which rises in my mind.

These criticisms, however, are directed solely to Mr. Whiting's method of applying his principle. The latter itself seems to me the true one. My suggestion is that a simpler adaptation of that principle, and one strictly in line with the contribution formula as now applied, would meet equally well the requirements of substantial equity, and would have the advantage of a business proposition easily explainable to the policy-holders. Mr. Whiting has shown keen powers of analysis and great ingenuity and mathematical skill in dealing with a problem which has apparently impressed most actuaries as being beyond the reach of such analysis. My criticisms on this method may be summed up in the statement that he has attacked it from a purely theoretical and subjective standpoint as an official analyzer rather than from the objective business standpoint of the policy-holder.

Mr. Craig: Mr. President, there is one item in Mr. Whiting's paper that I would like to speak upon—one thought in my mind concerning the view expressed by him. This view is not new, for it has been expressed in one form or another at different times by others. It is, " . . . the old members have built up the company at considerable cost to themselves and own it. It is unjust that new members should be allowed to participate in the benefits of an established plant. They should, at least, pay their own cost of entrance." I have been wondering whether that is really true in any well-regulated company. That is, whether the old members are really assessed for the expense of the new members. I apprehend that if the accounts were kept of each class, considering the policy-holders entering in any particular year as a class, as Mr. Whiting himself subsequently states in his paper, it will be found that the old members do not pay anything toward the expenses of the new members. We will assume that on the policies issued in a given year the terminal reserve amounts to a million dollars, and the actual fund on hand to meet that reserve is zero. There is a deficit on account of the policies issued in that year of one million dollars. The executive officers, as trustees of the general funds of the company, borrow, if you please, from that part of the general surplus which, for prudential reasons, is always retained, an amount sufficient to make up the deficit on account of the technical reserve on persisting policies issued in that year. At the end of the

second year it is found that the reserve on persisting policies amounts to $1,750,000 with a fund accumulated of $1,200,000. So that the deficit has decreased from a million dollars to $550,000, and at the end of the third year the deficit is entirely wiped out and a surplus accumulated. When this point has been reached this class has paid every dollar of expense that was ever charged against it, and no old policy-holder has contributed one cent. Surely a temporary loan which is repaid cannot be construed as a contribution toward the expense of new members. In principle this process has been going on indefinitely. The new policy-holders of last year are generally still in debt, and the new policy-holders of ten years ago probably did not show a clean balance sheet before the end of the third year, and as the general surplus funds of the company were temporarily applied to balance the deficit on account of their policies, they cannot complain of the application of the same rule to others.

This unapportioned surplus serves as a kind of working capital, supplying for a time the deficiency of the issue of each year. As one class settles up, a new class steps in to take its place, so that with a uniform issue, and assuming the expense, lapse, and mortality ratios to remain the same, a company could determine very closely the permanent amount required to meet the deficiencies of the constantly changing classes.

Mr. Wells: Mr. Whiting calls attention to a practice which, in my opinion, may seriously threaten the good name of companies, and the credit of insurance departments. He makes the following suggestion and comments: "Make the first year's insurance a preliminary one-year term risk, the permanent insurance to commence one year after the date of the policy at the premium rate for the then increased age. This method has come spontaneously into use on both sides of the Atlantic within a few years, on account of the necessities of the younger companies under the pressure of competition, and has proved successful with agents. It has the recommendation of high actuarial authorities, and no refusal to recognize it has yet appeared from State officials where the terms of the contract were stated so that the policy-holder could know the exact character of the insurance he was purchasing. This method of releasing the first year's premium from the obligation of a terminal reserve allows it to be wholly employed in meeting the heavy expenses and light mortality of this period, which should be confined strictly within this limit." We can

perhaps best discuss the matter in the concrete, taking an actual contract as written and valued.

A certain company writes, among other forms, a twenty-premium life policy, insuring a uniform amount in consideration of a uniform premium "to be paid in advance, and of the payment of a like sum on the ——— day of ———, in every year thereafter during the continuance of this policy, until twenty full years' premiums shall have been paid." The policy also provides for paid-up insurance in the event of lapse after the payment of three or more premiums for as many twentieths of the amount of the original insurance as there have been premiums paid. It is, in short, in every respect, a twenty-premium life policy, save only for the following clause in the application: "I agree * * * that during the first year succeeding the date of any policy which may be issued hereunder, the reserve value of the same shall be computed upon the Combined Experience Table of Mortality with four per cent. interest for the term rate." Note that there is nothing in this agreement which in any respect affects the relations between the company and the insured or beneficiaries, the premiums payable, the amount insured, or the funds in hand required by the company to enable it to meet its contracts as they mature. It has and can have been intended to have, but one effect—to influence the valuation of the policy by the insurance departments, and so reduce the company's liabilities and increase its surplus. Let me emphasize the fact that the obligation of the company and its actual liability is not one whit varied by this agreement. No one will question that the contract referred to should and would otherwise be valued as a twenty-premium life policy. But we are assured that the company varies what would otherwise be the legal reserve upon its contracts by such a stipulation.

The Actuary of the Insurance Department of the State in which the company in question has its home writes: "All of the policies issued by the company with the stated stipulation either in the contract itself or in the application" (and this includes endowments as well as life contracts) "are valued in this department in the same way, namely: First year, insurance only; subsequent years, for the regular contract as if it begun one year later on an age one year older and for a net premium for the term one year shorter. This is not done to avoid the putting up of a reserve, but it is done to enable the company to charge off and get rid of the over-expense of procuring business without drawing upon the reserve

funds belonging to other policy-holders." (*Life Insurance Courant*, Vol. II., page 16.) "This is not done to avoid the putting up of a reserve"; oh, no! it is only done to permit the company to spend the money, and having spent it, to reduce their apparent liabilities by that amount, so that they will not have to at once provide the assets to offset such liabilities.

A word as regards the use, so called, and so often decried, of the funds of the earlier members, to make up the excess, if any, of the legal net reserve over the net receipts from new business. It is obvious that if new business be obtained at such expense as to result in loss to the company, whether on policies quickly lapsed or on those longer continued, no bookkeeping device or method of valuation can save the company from such loss. No bookkeeping device can multiply a company's actual resources, and no method of computing a technical "reserve" can diminish its real liabilities. If then, the requirement of a net reserve as ordinarily computed is objectionable, it must be because such a reserve is unnecessary, or because of inequities resulting between the members of the company and not because of loss to the company as a whole. Do such inequities necessarily result? Assuredly not. The State merely requires that the company shall hold, in gross, assets equivalent to a certain sum. If now, the company, of its own volition, keeps such an amount of assets in hand, the law exercises no more compulsion upon it than does the law against theft upon one who has no disposition to steal. And whether it hold such sum of its own volition or under compulsion of the law, it may hold it as a reserve computed as it pleases, or as an undivided surplus. The law does not ask how it treats its assets in its own computations and for its own purposes.

I do not say that an injustice may not be done if the law requires a given surrender value to be paid at the option of the insured, or that a given reserve is necessary to solvency. I simply say that so long as a company holds a reserve of at least the amount required by the State, so long the method by which the State computes the reserve required is immaterial to the company, so that the only purpose to be achieved by the change suggested is the reduction of the legal reserve.

What is the effect of the proposed method of valuation upon the company's surplus? No reserve is charged because of policies at the end of the first year after issue, and the company's liabilities are diminished and its surplus increased by that amount. As years

go on the reserve charged against any individual policy approaches the legal reserve, but remains less than the legal reserve during the entire premium-paying period; and as business accumulates, the difference between the reserve as computed and the proper net reserve increases. Take, for example, the case before quoted, a twenty-payment life policy, issued at age thirty-five, for $10,000. The terminal net reserve at the end of the first year is $182.50, which is not charged as a liability in the statement of the department. At the end of three years the net reserve is $569.30; and the net reserve upon the paid-up insurance which the company guarantees to give in exchange is $546.10; but the reserve as computed by the department is only $399.50. The vice-president of the company says that these policies have been issued since 1887. Assuming a low ratio of lapse, we find that, at the end of eleven years, the decrease in the reserve charged amounts to more than ten per cent. of the amount insured annually, and that the reserve computed by this method would need to be increased by one-sixth to give the true net reserve.

I do not say that a proper and unavoidable expense attending the writing of new business should not be made account of in the computation of premiums and reserves; but the law as it now stands makes no provision for any special expense, and the method proposed is but a clumsy attempt to evade the law; nor does it commend itself as a suitable method even were it legal. I do say that to vary the ordinary net valuation because of a stipulation in the contract which in no way varies the liabilities or the resources of the company under the contract, and to present such a valuation to the public as a net valuation, without explanation, is to deceive the public, and to deprive such valuation of all title to credit.

A word respecting a minor point of Mr. Whiting's paper may be of interest to some. Mr. Whiting suggests the computation of premiums and reserves as if death claims were to be paid at the beginning of the policy year in which death occurs, instead of its end. This would involve a slightly larger reserve, reversing to that extent the effect of the suggestion to which we have heretofore referred, and giving a little margin for expense, were such margin needed. But it would increase the divergence between theory and practice, and so increase the present inequity resulting from such divergence. This inequity can be very simply adjusted, as follows:

Let m be the average fraction of a year by which claims are

prepaid; the average time elapsing between payment of claims and the end of the policy year.

Let i' be the rate of interest annually which money is worth.

Let q' be the probability of death.

Then the value of the prepayment of a death claim of S is, on the average, $m\, i^1\, S$; and if we multiply this by the probability of a policy becoming a claim, we shall have the value to each existing contract of the prepayment of claims, viz.: $m\, i^1\, q^1\, S$. The only variable in this expression is q^1, and this we ordinarily assume varies only with the age; hence we have only to compute the value of this expression for each age attained, and apply it irrespective of the form of the contract.

It will perhaps make the matter clearer to illustrate by substituting figures for the constants. If we assume that death claims are paid, on the average, five months before the end of the policy year, that money is worth 4.8 per cent., and that the probability of death is 80 per cent. of the tabular, we have m=5/12, i^1=.048, q^1=.8q_x, and the correction=.016$q_x S$. This, on the assumptions named, is the value of the practice to each existing contract, and the correction should be computed per unit insured for each age attained and deducted from the dividend. On the other hand, the gross interest lost to the company by the prepayment of claims, assumed above to be two per cent. of the amount of the death claims, should be added to the interest income, and so go to increase the surplus interest divided.

Mr. Fackler: In the main I agree with Mr. Whiting in many of his points, and think that the mode of simplifying the contribution formula would be very valuable indeed, but I am not yet prepared to accept the preliminary proposition on which it is based and assume that the death claims are payable at the beginning of the year. On the 215th page, under the head of Investments, Mr. Whiting says he would classify among the investment expenses "the cost of making, handling and protecting" assets. That, I think, is entirely proper; but when he adds "bad debts, losses over gains, taxes and repairs on assets," I cannot see the propriety of doing so. It seems to me that bad debts should go as a direct charge against interest, and not be regarded as an expense.

It is quite possible, of course, that a company's bad debts and losses in some years, combined with the taxes and repairs, might be considerably over a half of one per cent., and give the idea that the investment expenses were excessive and utterly inexcusable.

Therefore, I think, it would be much better to charge bad debts and losses, together with taxes and repairs, directly against the income from investments, and let the cost of handling, making and protecting investments be the only items considered as proper investment expenses.

I was also inclined to agree with the gentleman who criticised the putting of settlement expenses as a charge against interest receipts. It seems to me that those expenses should go in along with the death claims, because any reduction of actual death costs, as affected by adjustments, compromising claims, and so on, is a credit to that account, and it seems to me very proper to charge the expenses connected with it to it as a debit.

On the 220th page Mr. Whiting states, in the first paragraph, "The self-selection of the retirant is like the medical selection by the company of entrants, only milder in degree, and soon disappears, producing its greatest effect in the first year." This may be true in the case of many companies, and, under many circumstances, in all companies. But I would not like to concur in that, as the general average result from the selection against the company, of those that surrender in the case of all companies. I think that the retiring members, like those who select the endowment forms of insurance, the limited payment life rates, or those who select the tontine plan, may belong to an essentially long-lived stock, and therefore damage the whole after experience of a company by their retiring.

Mr. President, I may state that a company in the eastern part of New Jersey experimented with the plan which you mentioned, and after about a year gave up doing business. The plans were entirely above board in that case, for I had known and examined them as Actuary for the New Jersey Insurance Department. The nature of the contract was fully stated in the application and also in the policy, but, for some reason or other, the plan didn't work, but I don't mean to say that that necessarily shows that it cannot work.

Mr. Macaulay: Let me put a question: Is it possible for any company under the present conditions of business to provide out of the premiums which it receives in the first year of its policies, the reserves technically required at the end of that first year? I think we will all unhesitatingly answer: No; no matter how economically the company may be managed.

Then, the further question comes up: Is a company to be considered insolvent because it has not that reserve on hand at the

end of the first year of its existence? Most of us agree that it is by no means necessarily insolvent in reality, though it may be that State laws, which exact that technical reserve, may declare that it is insolvent in theory. But, surely, if law and common sense are at variance, there ought not to be much doubt as to which of the two we ought to throw overboard. The requiring of such a technical reserve has already wrought immense mischief and injury in times past. As Mr. McClintock has pointed out, in the paper which was read yesterday, it was one of the principal causes of the ruin of a number of young companies about a quarter of a century ago, many of which might to-day have been living, and strong and prosperous, but for that law. I think I am right, also, in saying that the Atlantic Mutual would have been saved but for that law. But, if a reserve at the end of the first year is unnecessary, what position should we take in the matter? In trying to arrive at a solution we should take into consideration both schools of actuarial thought. On the one hand we cannot ignore the ordinary school, by which the system of net valuation is considered essential. This system is so deeply rooted on this continent, and especially in the State Insurance Departments, that he is a very hopeful man who expects to overthrow it. And on the other hand, we have the method of gross valuations, endorsed but for solvency purposes only, by nearly all the leading actuaries of Great Britain, and by a number of prominent actuaries even on this side of the Atlantic, including Mr. McClintock.

Is any compromise between these two opposite schools of thought possible? It seems to me that Mr. Whiting's paper, or at least a part of it, is very important, because it provides just such a compromise by opening up a middle course, which to my mind satisfies the main requirements of each of these schools, and is, in fact, superior to both of them. I think it solves the difficulty in a most happy manner. It adapts Dr. Sprague's English idea to American conditions. On the one hand it avoids those uncertainties and margins for variation—arising from differences between the opinions of individual actuaries, or from the necessities of their companies—which are the great danger and the great objection to gross premium valuations. It does away with the necessity of setting aside a reserve at the end of the first year, and yet it adheres strictly to the principle of net valuations, and thus makes the system possible of adoption on this continent. It does justice, not only to young companies, but to the old members of old companies in the

distribution of expenses and profits. With all deference to the opinions of others, I cannot but think that this last point deserves our most serious consideration.

And, finally, Mr. Whiting's plan has this great advantage that it takes the public into the confidence of the company. The policies are not valued by the Insurance Departments or by the actuaries as anything different from what they really are, but, if they are properly written, each contract states clearly on its face what is being done, so that every policy-holder knows exactly what he is getting, and has, therefore, no cause for complaint.

Now, to sum up, if by altering the nature of the assurance, a policy contract can be so arranged as to comply with all the requirements of the law, and yet not impose on the company the unnecessary burden of providing for a reserve at the end of the first year, I, for one, think that that action is not only unobjectionable, but praiseworthy, and I consider that Mr. Whiting deserves the thanks of the Society for drawing our attention to this possible solution of a great and long-standing difficulty.

Mr. Wells spoke yesterday of a Twenty Payment Life Policy, which, if I understood him aright, guaranteed paid-up assurance equal to one-twentieth of the sum assured for each premium paid, and which in other respects was clearly a Twenty Payment Life Policy. He very properly objects to such an assurance being valued on the term basis for the first year, merely because a clause to that effect is inserted in it. But his remarks have no bearing upon a policy clearly worded as a term assurance for the first year, where no paid-up policy or surrender value whatever is given for the first premium, but where the paid-up value, in case of surrender, is one-nineteenth for each premium paid, and not one-twentieth, and only premiums after the first are taken into account. A policy, clearly and consistently worded in this way, can only be properly valued as what it is—a term assurance for the first year, and a Nineteen Payment Life Assurance thereafter. The fact that the first premium may be the same as the subsequent ones is of no importance, for net valuations have to do with net premiums only, and not with gross premiums.

Mr. Crawford: To the somewhat voluminous literature upon the subject, Mr. Whiting's paper I regard as a valuable contribution. A proper assessment of expenses cannot be made without due regard to equity, and this calls for an analysis of their causation. At least, for all practical purposes, Mr. Whiting's analysis is

sufficiently exhaustive, and his classification, I think, satisfactorily comprehensive.

Mr. Whiting kindly favored me with an advance copy of his supplemental paper just read, explanatory of what, perhaps, was not clear in his former treatment of the subject. In this the matter, at least so far as relates to expenses, is so clarified as to render unnecessary any discussion as to the meaning or as to the manner in which he would put his ideas into practice.

I submit some observations, however, concerning a few points to which, probably, all may not assent:

In his application of the several kinds of expenses to the mathematically unimpeachable Contribution Formula Settlement expenses (${}^3E$) "consisting of the expenses of investigating and resisting death claims," Mr. Whiting would make a charge against interest receipts; in other words, would have regard to this expense element in determining the rate of interest for improvement. This element of expense is thus made a function of the initial reserve, and so operates most heavily against high reserve policies. Now, just why the suggested "1—1/2 per cent. of face of death claims" should be assessed in greater proportion against, say, the ten-year endowment, than the plain life policy, may not be clear to all. I, for one, should be glad for further light upon this point.

Again, considerable concern is manifested about the initial cost —first year's cost for new business—because, under present methods, this cost exceeds the premium loadings, and must, therefore, be in part defrayed out of surplus to which the new members have in no degree contributed. To remedy this assumed inequity Mr. Whiting would regard the first year's insurance, under any form of policy, as term insurance, adjusting the premium as of age $x+1$ and beginning the reserve accumulation with the second year, in order to permit the use of the whole of the first premium for first year's expenses and mortality costs. I am not clear that this is a valuable expedient. It would certainly tend to discourage new applicants, for it requires a higher premium. It moreover points out a way to ample provision for enlarged expenses. If one premium is not sufficient to meet them, the consistent remedy would be to take two, and make the first two years term insurance, etc. Again, I am not clear that this or any similar expedient is demanded by considerations of equity. Is it true that so much of first year's expenses for new business as is not covered by the premium loading, is a tax upon the old members? Is it not lost sight of that

surrender charges—"secession gains"—are legitimate funds available for this purpose? Moreover, the effect of medical selection is so great as to result in a saving in mortality costs the first year of about 50 per cent. of the tabular mortality. This saving may properly be regarded as the result of certainly a large portion of the expenses of the Medical Department, and included in the initial or first year's costs, and hence may properly, it would appear, be passed to the credit side of the first year's expense account. The aggregate of these gains—secession and first year's mortality—including first year's premiums, deducted from gross expenditures fairly chargeable to new business, inclusive of the first year terminal reserve, would show, for well-managed companies, only a small balance, if any, to be defrayed by the old membership. That it is, at least, practical equity to charge this possible excess cost to the old membership is supported by the fact that they were once admitted as new members, and that any excess cost similarly resulting must have been a tax upon the then old membership.

No account is here taken of the possible loss, under present practice, because of the first year's secessions. The first year may not inaptly be regarded as a sort of winnowing season and the retirants as the chaff. It is the wheat that is valuable. To get it we must first gather it with its chaff. The expense is incurred for the sake of the wheat.

However, to prevent this possible loss, which, I am satisfied, is much less in well-regulated companies than, outside of the insurance offices, it is usually regarded. I would suggest that such companies, if any, as may be conscious of considerable loss from this source, charge it back, when ascertained at the end of the year, to the agents as bonus advances unearned. A possibly better and more practical method—a method successfully practiced by at least one company—is to hold back a portion of the first commission to be paid only upon renewal the second year.

In his supplementary paper Mr. Whiting ingeniously and ably formulates his ideas as advanced in the paper under consideration. His conclusion is "that our every-day practice is, after all, well-nigh mathematically correct, and calls for but little alteration." In this opinion I hereby concur.

[At the request of the President, Vice-President Ireland took the chair.]

Mr. Miller: There are two or three thoughts which have grown out of this discussion, which I would like to mention very

briefly. We are here discussing with considerable gravity an idea of what might be called a revolution in insurance methods. The general drift of the discussion has suggested to my mind that it seems to contemplate the importance, on our part, of trying to change methods, change laws, change the legal standard of reserve. If we as a body start to lobby to get the law changed, it would be a waste of time. The law to-day will permit any company that chooses to adopt this plan. Once write a policy which distinctly states, in a manner which every man capable of reading ought to understand; let it state distinctly that the first year's premium is only a term premium; that the real policy dates a year ahead; and I don't see how any insurance department in this country could refuse to value that policy as a term policy the first year, and thereafter value it as a policy dated one year ahead. Therefore anybody that wants to try this experiment is perfectly free to try it. The first time that I ever heard the suggestion a gentleman called on me and showed me a policy of that character which was a policy prepared for the use of some company, and asked me what I thought of it. I said, "It is first rate for a young company, if they can make it work. The only difficulty is that the thing won't work." Now that, in my judgment, is precisely the true view to take of this thing. The object of the whole discussion, the object of the whole line of thought, is to try to incur a heavy expense, and then conceal it. It won't conceal it. It is just as the ostrich conceals himself, by putting his head in the sand. So concealing the expense by issuing new policies by this method and valuing the policies as dated one year ahead, as a practical measure, in my opinion, it is not worth a rush.

Mr. Whiting: If there is no one else who desires to make any remarks on the discussion, I would like to avail myself of the privilege of authorship in closing the same and in making a short reply to some of the criticisms which have been brought out. The difference between Mr. Wright and myself as to method is so radical that it is useless to undertake to argue it.

Mr. Wright: Will you allow just a moment's interruption, Mr. Whiting? I wish to say that the one-term insurance plan, to my mind, is perfectly consistent with my own ideas of expense. It is not on that account that I criticise.

Mr. Whiting: It is something more than a one-year term plan I allude to. It is a distribution of all expenses, in which that is merely an item. Originally, when life insurance was started, the

contract might be divided, for our purpose, into two parts—the insurance portion and the portion that relates to expenses. In these early days a man was asked to appear before a Board of Directors, who, without the aid of any medical examiner, sized him up, and were rather more solicitous as to whether he was going to have smallpox than anything else, and if he was able to stand upon his feet and presented a robust appearance, and had been vaccinated, he was accepted. The greatest philosopher that we have ever had—Herbert Spencer—has told us that progress in science runs from the homogeneous to the heterogeneous, from the simple to the complex; and I think it is very apt in that class of philosophers known as poets, who take their inspiration from a study of human nature, that they should invariably couple simplicity with ignorance. And so it was in life insurance before it began to be noticed that age bore an important part in relation to the cost of insurance or the mortality part of the contract. At first all policies were put into a general class, the rates were the same for all insurance (three, and afterward seven, year terms), without distinctions of any kind, excepting that the man appeared to be robust. Afterward it was noticed that a distinction should be made in relation to age and sex; subsequently, that there should be some difference in the charge in relation to occupation, and so along the line we went from the simple to the complex. It is absolutely inevitable that we should do the same thing in relation to expense. Expenses have been in the past considered as a single item, and then apportioned according to some general rule of thumb, of which, perhaps, the most familiar was the old percentage of gross premium plan. And now Mr. Wright presents what seems to me a better, but still another, rule of thumb, which proposes to make the distribution along the line of the mortality charge. And he very properly goes to the centre of the thing by taking the mortality table itself as a basis upon which a loading is to be made. It has, however, it seems to me, precisely the same objection—*i. e.*, that it is a rule of thumb; that it does not discriminate all the sources of expenses; it does not go from the homogeneous to the heterogeneous, and it is not a progression along the lines of scientific expansion. Mr. Nichols has paid me the very delicate compliment of recognizing that the method, at least, which I have employed, was a true advance. But I feel rather broken-hearted at the fact that the only thing which, apart from the method, perhaps, is at all original in the entire paper, was something with which he dis-

agreed. Now, there is nothing new at all about this first-year term matter. It is an old story in Great Britain, well recognized and no longer questioned. I think the same tendency obtains in Canada. I have in my pocket the policies of eight different companies that are doing this business, some of which are at least three years old, on this side of the Atlantic. It has long passed the experimental stage, and "the swan song has not been sung." More companies, to my personal knowledge, are contemplating the same thing, and they wish to ascertain what the attitude of the actuarial profession may be in relation to the matter before they take the step. Some one of these eight companies is doing business in every State in this Union, and I have had or seen communications in some form from every insurance department in the United States of any consequence, and they all, with a single exception, state that they will value the policy according to its terms, meaning thereby that they will value the first year as a one-year term insurance if the terms of the policy are made clear enough to express that intent between the only parties that are interested in the matter at all, the policy-holder and the company.

A point has been raised in regard to whether there is not danger of misrepresentation in such contract so that the policy-holder will not understand it. If we are to stop at that, and take in everything that such suggestion might cover, insurance itself must cease. In the eye of the law, a man who receives a policy, the terms of which are clear, is strictly chargeable with having read and understood it, and we could do business upon no other basis. It is quite true, as Mr. Messenger has said, there are hundreds of policy-holders who think they have something entirely different from the policies they possess. That is not a legitimate criticism as far as this one form of policy is concerned, unless you intend to raise the point that all insurance must for similar liability be stopped, or some additional legislation take place, for the purpose of preventing misrepresentation in relation to the issue of policies. That is a matter entirely outside of the present discussion, it seems to me. The point upon which Mr. Nichols differed with me—and I am glad that he has practically withdrawn his paper for further consideration, because it gives me an opportunity to make an explanation which, perhaps, he may choose to embody in his perfected criticism—I had thought was really the best part of my whole paper. The idea is simply this, of moving the release of the cost of the insurance from the end to the beginning of the year. Now, Mr. Nichols makes the

point that although it is true that there is an acknowledged error in having it at the end of the year of about five months' loss of interest, that there would be an equal error, a plus error, instead of a minus error, of an interest earning of seven months too much, if we put it at the beginning of the year; and that then we would be further off than ever from the centre of the fact of the case. That would be entirely true if the matter rested there; but if Mr. Nichols will be kind enough to look at the paper once more he will see that I have coupled with the mortality cost the cost of settling claims, and when he comes to add the average cost of such settlement, which I have found from the returns to be about $15.00 per thousand of insurance, he will find then that the seven months' interest gains are offset, and it comes very close indeed to the centre of the two facts combined.

The point has been raised by Mr. Fackler, and suggested by another, that it would seem more appropriate that instead of the settlement expense being charged to interest gain that it should be chargeable to mortality account. I think that idea will disappear on further investigation. The mortality that will take place, and the amount of released cost of insurance, are almost the same quantity, taking one year with another; therefore a multiple of one becomes substantially a multiple of the other, and as the cost of insurance released at the beginning of the year is held for seven months on an average before being used the interest for which comes to the company through its interest account, it seems to me entirely appropriate that a deduction for settling claims should likewise be made from interest account. And it all comes down to the same thing in the end, never mind which way you start it.

My esteemed friend, Mr. Wells, has made a valuable contribution to the discussion, and one which I wish to treat with entire fairness. He has alluded to a form of contract which makes the worst possible case for those on my side, and about the best possible case for his side. There is but one company using that form, and, so far as I know, it is the only instance in which the premium of the first year is made the same as the premium of the subsequent years. These contracts appear to-day in three distinct forms. One form says, immediately under the first year's premium, in brackets, "which shall be considered as a premium for one year's preliminary insurance"; and the contract goes on further to say, "in consideration of a like sum for subsequent years, which shall be deemed to be a premium on a life contract," or whatever kind

the deferred contract is. Another form is where the policy states that the insurance is for "a one-year term," and then goes on to state that the policy-holder has the right of renewal thereafter at a different premium, as a nine, fourteen or nineteen limited payment insurance, or whole life payment, or whatever else the deferred insurance may be. Another form states, "that in consideration of the reduced premium of the first year, this contract for all purposes shall be deemed to be a preliminary one-year term insurance for the first year" and thereafter whatever the balance of it is intended to be. I don't know how language, in any one of the three cases, can be made any plainer for the purpose of expressing the intent of the company, and certainly the policy-holder must be deemed to be constructively cognizant of that contract, or we can't do business at all. Mr. Wells, taking his own selected case, where the premium is to be the same during the first and subsequent years, says, if the premium is uniform, that it necessarily must happen that, never mind what language we put into the policy, the reserve to be held must be the same as though there were no agreement for first year being term insurance in the policy. I think I put the matter fairly. Let me put the case in another light. Supposing a company should issue a policy, No. 10,103, to A, for a one-year term insurance, to cease thereafter. Supposing the company at the same time issues him another policy, No. 10,104, which policy shall be a deferred life policy, to take place, for purposes of insurance, a year from now, the first premium to be due thereon a year hence. Here are two contracts: one, a term insurance; the other, a deferred life insurance. There can be no question at all of the legality of such a transaction. The company has a perfect right to write such policies. There can be no doubt what construction the Department will place upon them in valuing. The first policy would have to be valued as a term insurance; the second policy would not be valued until the second premium was paid, and then only as a policy of its kind, commencing with that year. Now, suppose you join those two policies together in one document, is there any good reason why the reserve should be altered from what they were when two pieces of paper were used to print the contract? Shall the distinct understanding expressed by all the parties to the contract be overthrown because one piece of paper has been used instead of two?

I, for one, contend that it makes no difference. You have got the same phraseology. You have got the two contracts together.

No doubt there is a hiatus somewhere. I recognize the force of Mr. Wells' illustration, that if you have the same amount of insurance, and the same gross premium, in both instances the same result should be obtained; but it also follows in the illustration that I make that if the policies are separately valued, as a term policy the first year and a deferred life policy subsequent to that time, if the two documents are ethically put together, there has no change taken place in the status. Now, how are you to reconcile those two contradictory statements? It seems to me another case of the failure of net-premium valuations, when ignorantly and arbitrarily applied, of which Mr. Nichols, in his very eloquent paper read before the International Congress and reprinted in our own Transactions, has already given us examples; it is simply a case of the failure of net-premium valuations to fill the bill when the net premium is made to depend upon the character of the gross premium regardless of the practical facts concerning expense necessities and of the other terms of the contract. If it were a case of pure gross valuations that we were talking about, there would be no distinction between Mr. Wells' illustration and mine. The policy, separately or when joined together physically, would then have precisely the same result, as far as values are concerned. But the law compels net valuations, and I contend that in order to find what net premium must be used the *whole* contract and nature of the business as to expenses must be considered, and not merely the single fact that the gross premiums happen to be level. Every one concedes that a gross valuation, with proper deductions for future expenses, is the only proper measure of solvency. But the Legislature has, very properly, for all other purposes prescribed a net-premium method in order to restrict a dissipation of a certain part of the surplus over mere solvency requirements when not necessary or without the consent of the policy-holder. This one-year preliminary term clause is such a consent, properly granted because of the excess of first year's expenses, and necessary in order to charge it to the policies which occasion it, instead of borrowing such excess from old policy-holders surreptitiously, for which latter practice I contend there is neither law nor equity.

A NOTE ON PREMIUM LOADING.

PAGES 255-261, VOL. V.

REPLY TO CRITICISMS BY MR. STARR AND MR. WING.

MR. W. C. WRIGHT: Mr. Starr is too lenient in one way toward my method of providing for insurance expense, in the computation

shown in his "Table II." While he insists in the particular case under discussion that the provided death costs shall not be less than those resulting from the use of the Combined Experience 4 per cent. net premiums of the two middle columns of his "Table I.," or $280.20—more than 62½ per cent. of those yielded by what he calls my "mortality" table—he does not insist on coupling an expense provision which is 60 per cent. thereof for each and every year, with what he regards as the true death costs. If he did, and it would be logical to do so and replace my "expense" figures by such sums, his figures in "Table II." would reveal a still greater final negative result than they do. But call them what he may, the figures of the first two columns of his "Table I." refute the conclusion which he rests on the evidence of "Table II.," for dealing with their yearly total amounts exactly as he deals with the sums in the first and last columns of his "Table II.," and employing what he calls my "computed death costs" in the fourth, without the analysis he objects to, will expose no negative result whatever, but produce at the foot of the last column the balance of exactly $50,000, which the conditions of the policy require for its satisfaction at maturity. The reason for this difference is that the latter computation, which deals with a higher premium or reserve than the net premium of the Combined Experience Table, makes due and correct allowance for the fact that no restitution of any such excess premium is to be made in case of the death of the policy-holder within the term of the policy; while Mr. Starr ignores this justly qualifying circumstance in the computation displayed in his "Table II.," and thus his successive negatives show merely the growing measure of the company's indebtedness to the policy-holder for value received through the limitation of risk by a high reserve, and not allowed for by his reckoning. There is no way to make this allowance correctly, while observing the fixed conditions, except that which I have followed.

Mr. Starr makes the astounding remark in his first paragraph that "The resolution of the computed death costs into a column of death cost and a column of insurance expense" (by me) "is made upon the apparent assumption that an increase of the death rate causes a proportional increase of the death cost." If he here means allowance for death cost, my foregoing explanation refutes his supposition. If he means by "death cost" actual death cost, any written, printed, or spoken remark of mine which may sanction this interpretation, if any does, must in justice be charged to acci-

dent; for it is wholly because I am convinced that a calculated high death rate, or *rate of decrement* as I prefer to say when a dual object is in view, in the figures of our tables, does not at all affect the actual death rate among the members of the companies which we serve; and, therefore, when using such liberal assumptions in our premium and reserve calculations, we may unfailingly count on ample and proportionate remainders applicable to other purposes than the bare satisfaction of death claims.

Operating with the figures of any given table of mortality with a view to embrace or make a provision for expense in the premiums deduced therefrom, and by the subsequent process of dealing with them in determining reserve which may be proposed, is no more tampering with or altering the actual rate of mortality or other *facts* than adding to or altering a so-called net premium for a like purpose is. Like algebraic formulæ, tables of "mortality" and of "gross decrement" are both merely artificial devices enabling us to correctly estimate and deal with facts.

The practical question is, which method yields the most equitable and satisfactory results, always remembering that a mutual life insurance company, at least, exists primarily for the good of its constituent members, and not the gratification of any real or imagined need of any class of its employés.

Mr. Starr broaches a question not germane to my "Note" when he points out, as he does in his "Table I.," which illustrates the point very perfectly, that the employment of any table of "mortality" or of "decrements" which is conservative for insurance will be liberal for endowment. This is inevitable, and it is just. It is possible to combine a conservative endowment premium with a conservative insurance one in making the premium of an ordinary endowment insurance policy, without violation of my method of loading for expense, as much as any other; but it is needless, if not absolutely unjust in any case, to do this. It is enough to be conservative in interest assumption, and as respects the insurance or paramount future risk of the contract, for the other or risk of survival simply operates as a true "hedge" against it. It is unreasonable to say to an applicant for an endowment insurance policy, *we must use a safe table of mortality in fixing your insurance premium, because you are liable to die soon, and, in the same breath, we must use a low one for endowment because you are liable to live long!*

I can assure Mr. Wing that many of the most beneficial legislative measures, when first presented, have met with a committee

report of "ought not to pass"; and, as to the particular matter to which he refers, the result of my inquiry wholly contradicts the supposition that the bill was reported against because it was judged to be based on faulty principles. It is with principles and their application alone that we have to do in the present discussion.

But I trust that what I am about to read in reply to the leading point, or the figures of his criticism of my "Note," may help to relieve him of anxiety as to any measure which may originate with me.

In advocating a new and improved method of dealing with the expense question, I am wholly unconscious of a desire to oppose or invade the just rights and liberties, or to curtail the just reward, of any one having to do with life insurance.

The most I can claim for my method is that it preserves equity between policies of different terms, and its tendency will be favorable to economy. I cannot deny that extravagance is possible under it, if assumptions are employed which admit thereof, or ruin if extravagance is indulged in without providing such means for it.

Mr. Wing's figures make it hard for me to believe that he has studied my writings as closely as he declares, because they appear to me to simply illustrate a point which I particularly adverted to in my "Note." I pointed out that a large tax for expense the first year cannot be paid out of a single premium without unsafety or destroying the natural measure of attractiveness of the policy; but that, when provision for expense is correctly made, the policy may, on the whole, yield a quite satisfactory compensation to the agent and contribution to expenses in general. It will then be in order to allow the agent an annual fee for persuading the policy-holder not to give it up.

This is a new thing, and certainly one not objectionable to agents. A single premium policy is not at all attractive if it does not bear liberal cash surrender values, and if it does, the service of inducing the policy-holder to continue, rather than surrender it and try some other investment of its value, is certainly worth paying something for. A first commission of 5 per cent., or $1,000 or more, for securing a single premium of about $20,000, mostly for investment, is very extravagant. An annual premium policy for the same amount would be of much more value to the company and command considerably less commission.

When a single premium policy is applied for, it is usually because the applicant insists on it, rather than one of other terms,

and needs little solicitation if the figures shown him are satisfactory. The agent's work in securing such a $20,000 premium bears no comparison, for instance, with that of an architect who takes full charge of the construction of a $20,000 house, and few architects, I suppose, would think of charging more than 5 per cent. for that service.

The first commission in the case cited in my "Note," and in any like case, should not exceed the surrender charge and a fraction of the surplus interest of the first year, or, say, in that case, $250 or $300; but a little inspection of the figures given will show that the policy yields provisions for, and will readily pay subsequent annual fees such that the agent will realize and earn more, perhaps, than $1,500 out of its proceeds during its continuance.

I owe Mr. Wing thanks for presenting figures which I think will argue more in favor of the method of providing for expense which I recommend the more they are studied, and studied in connection with those I have given myself.

I think the gain and loss exhibit returns of the excellent company with which Mr. Wing is connected prove that it is possible to make an estimate of investment expenses sufficiently correct for all practical purposes. That they certainly should, if possible, not be allowed to exceed the returns of investment not appropriated or hypothecated to other purposes, is a maxim which I take for granted he does not dispute. It is safe, I think, to let estimates falling within this limit go unchallenged.

He misconceives the bearing of my remark of surprise, that an application such as I cited should go begging, and my use in another place of the words, an "equally liberal premium." I coupled the former with no specific figures; but held, and do so now, that a premium could be named making the bargain safe and desirable for both parties; and by the latter I meant to be understood as not regarding a premium of $22,295 as high, if based on suitable assumptions. Otherwise, I would have said a more liberal premium, instead of an equally liberal one.

Every man here knows that I favor a 3 per cent. reserve for participating policies, and, consequently, I favor a premium of $25,665.55, and not $21,024.85, in the case dealt with in my "Note." But, as the figures with which I undertook to compare mine were upon a 4 per cent. interest basis, I properly used a premium cast on that basis to display the superiority of my method of providing for expense. I might have used 3 or 3½ per cent.

premium figures, but then it would have been necessary to make an explanation like this of the fact, and I certainly would have been ready to do so if I had thought any member would be misled if I did not.

In closing, permit me to remark that if I have somewhat elaborately replied to the criticisms of Mr. Starr and Mr. Wing, I have this excuse that they have, perhaps, treated the negative side of the argument as exhaustively and ably as it is possible to treat it.

SELECT LIFE TABLES AS THE BASIS OF PREMIUM RATES. THOMAS BRADSHAW.

PAGE 225, VOL. V.

MR. SALTER: I wish to acknowledge my personal indebtedness to Mr. Bradshaw for his paper on Select Life Tables. The paper is a résumé of what has been written on the subject by British experts during the past sixty-five years. It contains many judicious observations, furnishing an admirable introduction to the topic in question, as well as throwing light upon the general subject of selection. After reading the papers in the Journal of the Institute of Actuaries to which Mr. Bradshaw directs our attention, I have reached the conclusion that his quotations therefrom are well suited to the purpose in view. Mr. Bradshaw quotes from the papers of Messrs. Morgan (1834), Spens (1844 and 1862), J. A. Higham (1850 and 1851), Berridge (1876), King (1876), and, lastly, Dr. Sprague (1876). The chief interest of his discussion centres about the writings of the last-named, the author (Mr. Bradshaw) closing with a careful comparison between the Select Net Premium Tables of Dr. Sprague (which are appended to the paper) and net premiums by the H^M Table as a standard.

This comparison would be easier to follow if the H^M standard premiums were printed alongside of the select net rates, although Mr. Bradshaw's comparison of the two is so minute as to render such extra printing almost unnecessary. It would be better, also, for convenient reference if the tables in question had the caption "Table I.," "Table II.," etc., respectively, as they are so alluded to in the text.

In the desultory remarks which follow a number of quotations from British and American experts are brought together. I endeavor also to show to some extent the practical bearing of the investigations thus far made.

In my opinion the chief point brought out in the paper is, that if due regard is had to the effects of selection, it will be found that the rates at present charged by companies using a mixed mortality table as a basis are inadequate at young ages. Mr. Bradshaw

states that some time ago it was no secret that insurances could be secured in some life companies in Great Britain at less than the true net rate, adding that Select Life Tables have now come to be generally employed by British Life Offices in preference to Mixed Tables for the purpose of determining premium rates. Many high authorities agree that rates for younger ages, based on a Mixed Table, are inadequate, and incidentally that those at high ages are excessive.

In 1893 Mr. Macaulay called attention to this point (A. S. A., III., 220, 4th, 5th and 6th conclusions), recommending a more careful inspection of applicants at young ages. Mr. George King (J. I. A., XX., 108) went further and said that even Dr. Sprague's Select Premiums are too low at younger ages, because they do not take account of lapses. Mr. Manly (J. I. A., XIX., 363) conjectured that "people at the age of twenty are induced by agents and others to take out policies, and that then, having nobody to care for and being of an age when persons like to enjoy themselves and sometimes spend more than they earn, they forfeit the policies, unless they turn out bad lives or have an inclination to settle down in life."

On the other hand, if rates according to a Mixed Table at ages above sixty are too high, it may be argued that the moral hazard incident to old-age insurances tends to neutralize such excess.

Regarding the exaggeration of the expectation of life due to ignoring the effects of selection, we see by Mr. Higham's paper (J. I. A., XX., 4) that at age twenty, the general expectation (Equitable Society) exceeds the select expectation by nine per cent. of the select; at age thirty by six per cent.; while at age fifty the two expectations are equal, and at sixty the general is less than the select by about five per cent. of the select (the "General Table" following Carlisle Mortality closely). The table below is a comparison, also taken from Mr. Higham's paper of

THREE PER CENT. ANNUITIES
(1st payment one year from issue).

Age.	Select Lives, Equitable Society.	General Table, Equitable Society.	Carlisle.	Jenkin Jones.
20	$20.88	$21.87	$21.69	$21.80
30	19.18	19.80	19.57	19.75
40	17.13	17.11	17.14	17.12
50	13.82	13.82	14.30	13.82
60	10.89	10.35	10.49	10.19

I reproduce also a table prepared by Mr. King (J. I. A., XX., 108), which shows how closely Dr. Sprague's Select Net Premiums, at the principal ages for insurance, follow those of the Carlisle Table.

WHOLE LIFE NET PREMIUMS PER $1,000.

THREE PER CENT.

Age.	Dr. Sprague.	Institute.	Carlisle.
20	$14.99	$14.27	$14.94
30	19.24	18.80	19.52
40	26.04	25.89	25.99

In the researches alluded to by Mr. Bradshaw, one of the chief difficulties lay in the paucity of the data available.* Mr. Morgan stated (J. I. A., XX., 2) that the correct method would unquestionably be to make distinct tables from the mortality of each distinct class (or age). Some authors overcame the difficulty by grouping three, five or ten ages, others by dividing all insuring ages into four groups (compare McClintock on Effects of Selection, III., 108) and still others by combining all ages in one group.

Another difficulty encountered by the English writers who made use of the data in the Institute Experience of 1869 grew out of the fact that this experience was based upon calendar years. Many ingenious methods were devised for dealing with the troublesome "Year 0 of Assurance." (Note Dr. Sprague's reply to Discussion, J. I. A., XX., 111.)

With reference to the effect of "suspended mortality" (to use Mr. Berridge's happy phrase), Mr. Higham concludes (J. I. A., I., 190) after comparing his Select Table with the Farr Mortality, that assured lives are for some time after selection much better than the community at large, but that after a time they become much worse. This deterioration he accounts for by the adverse selection from lapse.

An important phase of the question is found in the fact that selection differs in the case of different kinds of policies. In this connection Mr. King (J. I. A., XIX., 383) calls our attention to the

* Investigations by Mr. Spens (Scottish Amicable Exp.) involved 10,000 lives.
Mr. Higham (Equitable), ... 12,947 "
Mr. Higham (Seventeen Offices), ... 55,506 "
Mr. King (Twenty Offices), ... 127,471 "

circumstance that in nineteen of the twenty offices involved in the Institute Experience, ninety per cent. of the total business on the books was on the whole life plan. (The Seventeen Offices' Experience shows, of course, a much higher percentage.)

The question will now naturally arise as to whether there is any practical value to these inquiries. In discussing Dr. Sprague's paper (J. I. A., XX., 110), Mr. Sutton says that for all practical purposes we are just where we were before. On the other hand, Mr. King points out that although it may not be worth while to change premium rates in allowing for the factor of selection, yet in distributing surplus the loading over a select net table might be used to advantage. In discussing Mr. Berridge's paper (J. I. A., XIX., 364), Mr. Macfayden says that the chief value of the conclusions therein is that they are a test of the correctness of the $H^{M\,(5)}$ Table (the standard, by the way, which Dr. Sprague used in a part of his work). Mr. Williams (J. I. A., XX., 107) remarks in connection with Dr. Sprague's tables that "it is satisfactory to find that we are perfectly safe in using the general tables for practical purposes," emphasizing the important object served by inquiries into the subject of Select Tables by way of confirming the general correctness of tables commonly in use.

By reference to the pages of our Transactions, many valuable treatises and discussions will be found bearing more or less directly upon the subject in hand.

As we extend our knowledge concerning the facts of American mortality among insured lives, of the rate of discontinuance and of other conditions of the business in this country, we shall, by the aid of the valuable researches of Mr. Bradshaw and others, be enabled to judge as to the wisdom of modifying our office premiums and net reserves in the direction indicated.

Mr. Hildebrand: It is unquestioned that the rate of mortality for the first years of insurance is affected by the age and the duration of the insurance, being, in fact, a function of these two variables. That fact having been once established, it was natural to attempt to measure the influence of the duration of the insurance upon premiums and policy values.

In the analysis of the business on the books of nineteen out of the twenty offices which went to make up the "Institute Experience," a prominent feature is the excess of the ordinary life business over all the rest combined, and which is given by Mr. King at 90.33 per cent. of the total. Hence, at the very threshold of the difficulties of the

new situation, when we ask how well are these particular Select Tables adapted to the calculation of correct premiums for different forms of insurances, we are obliged to doubt their general suitability; for as each new investigation into mortality is more fully carried out as regards its component parts, it will be realized, I believe, that the results of this present investigation, in any event, are not conclusive. Since the publication of Mr. Sprague's masterly paper, certain interesting facts brought out in connection with the experience of the individual companies have thrown new light upon the rate of the mortality to which certain groups of risk are subjected, and shown the expediency of verifying the results obtained, from the mass of information on these points in the possession of offices, either singly or combined. I do not find that the influence of the form of policy upon the mortality has come up for investigation abroad, at least on any very extensive scale, and this, no doubt, is due to the scarcity of materials along this line, and not to a lack of appreciation of its value.

I take it that the principal use of Select Tables will be in the calculation of correct premiums, although, as regards reserves, such tables are of service as indicating the proper correction to be made to existing tables, or to any approximate method that may be adopted for the sake of simplicity, thereby permitting the actuary to form an opinion as to the sufficiency of certain reserves.

The assumption that the benefit of selection runs out within five years, and which is at the foundation of Mr. Sprague's tables, may be open to question. Its adoption was probably due, in large measure, to the fact that, by the inclusion of additional years of insurance in which it is known selection does act, the aggregate material remaining would have lost weight as a basis for generalities.

It will be entirely appropriate, within the limits of these remarks, to consider the average policy values resulting from the adoption of the present Select Table, as compared with those derived from the combined H^M and $H^{M(5)}$ Table. After the lapse of the first five years it is not difficult, as might at first thought appear, to deduce the difference between these two sets of policy values, and to determine the direction in which this difference lies. If we take the general formula for the value of a policy, namely ${}_nV_x = A_{x+n} - P_x(1 + a_{x+n})$, it is evident, bearing in mind the fundamental principles underlying these Select Tables, that the functions A_{x+n} and $1 + a_{x+n}$ are one and the same in the two sets of tables; so that the difference between the policy values is merely $(P - P^1)$

$(1+a_{x+n})$ where P is the H^M net premium and P^1 the select premium; but the factor $(P—P^1)$ is a constant for each age at entry, regardless of the duration of the insurance, so that we can easily judge of the extent of the difference in values for the same age at entry by keeping in view the annuity immediate. But the annuity diminishes as the life grows older, and we, therefore, conclude that, for any age at entry, the difference in policy values diminishes year by year. Since the second term of the right hand member of the original equation is negative, it follows that the policy values, as found by the Select Table, will be greater or less than those derived from the combined H^M and $H^{M(5)}$ Table, according as P^1 —the net select premium—is less or greater than the net premium deduced from the H^M Table. A simple illustration will tend to make clearer the difference in values. Thus, at age at entry 20, ordinary life policy, the difference in premiums is 1.41 per thousand of insurance, the select premium being in excess; after ten years the $H^{M(5)}$ annuity immediate is 19.1131. Making the multiplication, we have as the difference in policy values, 26.95, the select value being the smaller; after twenty-five years the select value is less by only 21.90; after fifty years the reduction is 10.48. and so on. When we get to the higher ages, as the H^M premium exceeds the select premium, it follows that the select policy values will be greater than those of the combined H^M and $H^{M(5)}$ Table.

Similar considerations apply to the values of other forms of policies, merely substituting temporary annuities, depending upon the future premiums payable, for life annuities. Examples might be multiplied; but as Mr. Bradshaw has already indicated the differences that occur in the net premiums, and the directions in which these differences lie, also the ages at which the minimum variation takes place, we have merely to multiply these differences by the value of the annuities immediate in order to obtain a clear insight into the changes in policy values.

Mr. St. John: Mr. Bradshaw discusses in his paper entitled "Select Life Tables, etc.," a fundamental question in the practice of life insurance, relating to premiums based upon mortality tables which present the *probable*—not factitious—incidence of the deaths among a body of insured lives.

It is evident that in a community which includes indiscriminately at each age, members in every condition of health—from the robust to the moribund—the line of progress during the course of time, in the mortality, will differ widely from that which will

obtain in another society from which there had just now been excluded all persons affected with existing disease, intemperate habits, or hereditary taint.

But the difference which will result between the scales of similar premiums computed under these two diverse systems of mortality is, however, far from obvious, and Mr. Bradshaw has rendered an important service by presenting elaborate tables—with relevant comments—elucidating this question. He has selected as an exponent of the first-mentioned condition, the familiar H^M Table, and of the second, the series known as Select Life Tables (based upon the same aggregate of experience as the H^M) constructed by the distinguished English actuary, Doctor Sprague.

It appears from an inspection of the Tables I., II., III. and IV. (in Mr. Bradshaw's paper), that the total premium income of a life company would not be seriously affected by a change in practice from the H^M to the Select Tables, but it is certain that greater equity would thus be generally attained in the distribution of the prices for the various forms of insurance; especially under a non-participating scheme in which the premiums were loaded by a uniform percentage.

Mr. Bradshaw observes: "This important condition of assuming that the ultimate mortality is represented by the $H^{M(5)}$ Table, which latter is considered a standard table and is held in high repute, has the advantage of limiting the number of select tables . . . and of affording results of a most important character."

The ultimate (*i. e.*, maximum) scale of mortality in the experience of the twenty British companies is not attained five years from the date of entrance; but it may be inferred, from an examination of the following illustration* that to extend Doctor Sprague's analysis in a similar manner for an additional period of five years, would not result in a material change in the scale of premiums; the tendency would be to somewhat increase the divergence —in the two series—noted in Tables I., II., III. and IV. previously referred to.

* Taken from Report of M. Léon Marie—1st International Congress of Actuaries, Brussels, 1895.

RATES OF MORTALITY OF THE H^M TABLE.

DURATION RUN SINCE ENTRANCE.

Ages Attained.	Less than 5 Years.	More than 5 Years.	Less than 10 Years.	More than 10 Years.
25 to 29	0.0062	0.0097	0.0069	0.0081
30 to 34	0.0074	0.0094	0.0081	0.0099
35 to 39	0.0081	0.0108	0.0094	0.0116
40 to 44	0.0089	0.0116	0.0098	0.0125
45 to 49	0.0118	0.0143	0.0125	0.0151
50 to 54	0.0125	0.0188	0.0153	0.0192
55 to 59	0.0194	0.0250	0.0218	0.0254

The chief incentive to the use of Select Tables is not, however, the equitable adjustment of prices—since this may be substantially attained by other methods—it lies in the essential service rendered by a separation—to a degree of accuracy not otherwise attainable—of the net premium income into its two components, contribution to death claims and the reserve fund, for policies of all durations; but a numerical illustration will aid in the elucidation of this point.

At age 43 the annual premiums for whole-life insurance are practically identical by the H^M and Doctor Sprague's Select Tables (4 per cent. interest), viz., $.026404 per unit; the living and dying at this age by the former are 79,717 and 887, respectively; the number entering age 44 is 78,830. Assuming the payment of 79,717 premiums of $.026404 each, and improving the fund for one year at 4 per cent., it amounts to $2,189.041608; deducting 887 claims and dividing the remainder equally among the survivors (78,830), and there results the net value for each remaining unit of insurance, .016517, or $16.52 per $1,000.

But this *tabular* number of claims (887) is not the *probable* number; it relates to neither the early nor later years of insurance nor to any definite period. It is an average derived from a series *progressing by a determinate law*, and positive and negative fluctuations from it are not equally probable.

In the preceding example let there be substituted for the tabular deaths (887) of the H^M, the probable claims (pertaining to the first year of insurance) of the Select Tables, viz., 477, for the same number (79,717) of entrants; deducting these expected (477) claims from the fund of $2,189.041608, and dividing the remainder among the probable survivors (79,240) entering age 44 (in the second year

of insurance), and there results the net value for each remaining unit of insurance, .02160578, or $21.62 per 1,000—the excess of the second value over the first is not less than 30 per cent. Examples are appended to this note of net values (3½ per cent. interest) by both the H^M and Sprague's Tables, and a brief examination of these illustrations will disclose the law of deviation in the two series of reserves. It will be observed that the deficiencies in the H^M values diminish during the later periods, and that under ages 20 and 25 they cease after the fifth year.

Since the premiums at these ages (20 and 25) are higher by the Select Tables, the lower corresponding net values of the fifth and subsequent years result from the fact that through the more rapid deterioration of vitality attending early insured life, the ultimate or $H^{M(5)}$ mortality (materially higher than that of the H^M Table) is reached sooner under these than the other lives.

By reference to the examples, it plainly appears (assuming the mortuary experience of the twenty British companies), 1st. That by far the greater number of the H^M net values of the first twenty years are deficient—a few being larger than the corresponding reserves of the "Select Tables"; 2d. That distributions of surplus under the former system of net valuation are erroneous, and that considerable sums which ought to be reserved are apportioned as surplus—to the prejudice of the future; and it may be remarked, *en passant*, that by employing the latter system of premiums and reserves the vexed and perennial question termed "the distribution of vitality gains" could be readily and definitely settled.

It is apparent that a rational use of select or analyzed mortality tables is founded on their intelligent adaptation to the several purposes for which they are employed. In general this would result in greater specialization and more exact classification in the reduction of mortality observations. Under the scheme of insurance known as "Tontine" or "Semi-Tontine," for example, two features of experience obtain, an exceptionally high degree of vitality in the earlier, followed by an abnormal increase in the mortality of the later period of duration. Manifestly, the analyzed tables which might be essential to sound practice under these conditions would be ill-suited for the computation of prices pertaining to temporary hazards and special forms of term insurance.

Mr. Bradshaw states: "It has been recognized in Great Britain that Select Life Tables are more appropriate for the calculation of office premiums than the ordinary Mixed Tables, inasmuch as they

afford a more accurate measure of the risk premiums than the aggregate tables; consequently Select Life Tables have been very generally employed by British life insurance companies for that purpose."

The vast extent of the experience of American life companies, the great variety of circumstances under which it has progressed, and the rapidity of its development, are all conditions which render this extensive mass of material exceedingly well adapted to analysis by means of a series of Select Life Tables, and it is to be hoped, that in due course of time, American actuaries will enrich existing vital statistics by valuable contributions of this character.

Tabular Values for $1,000.

Sprague's Select Tables, 3½% Annual Life.

$$n\,V'_x = 1 - \left[(1 + a_{[x]+n}) \div (1 + a_{[x]})\right]$$

H^M Table, 3½% Annual Life.

$$n\,V_x = 1 - \left[(1 + a_{x-n}) \div (1 + a_x)\right]$$

x	$n=1$	$n=2$	$n=3$	$n=5$	$n=10$	$n=15$	$n=20$	x
20	**10.28**	**17.47**	**23.26**	**34.70**	**72.45**	**123.12**	**179.76**	20
	7.48	14.88	22.48	38.92	85.23	136.64	194.21	
25	**12.12**	**21.90**	**30.47**	**47.81**	**99.92**	**157.97**	**226.34**	25
	9.17	18.67	28.35	48.19	101.68	161.58	229.99	
30	**14.35**	**26.69**	**38.15**	**61.16**	**121.80**	**193.11**	**271.13**	30
	10.67	21.60	32 84	56.20	119.13	191.00	269.28	
35	**16.91**	**31.89**	**46.10**	**73.58**	**148.80**	**231.11**	**318.46**	35
	12.82	25.88	39.18	66 68	142.83	225.77	315.21	
40	**20.25**	**38.50**	**55.96**	**90.16**	**178.14**	**271.50**	**370.20**	40
	15.37	31.26	47.65	81.59	170.45	266.28	366.49	
45	**24.54**	**46.85**	**68.14**	**108.45**	**209.73**	**316.79**	**423.24**	45
	18.93	38.04	57.35	96.76	201.10	310.21	418.34	
50	**29.77**	**56.72**	**82.09**	**129.72**	**247.62**	**364.84**	**479.70**	50
	22.36	45.17	68.36	115.52	236.32	356.03	473.46	
55	**36.47**	**68.91**	**98.53**	**153.55**	**285.43**	**414.64**	**534.59**	55
	27.02	54.21	81.56	136.57	271.92	404.69	526.26	
60	**45.04**	**83.81**	**117.21**	**177.62**	**326.33**	**464.37**		60
	31.80	63.43	94.82	156.76	310.52	451.33		
65	**56.02**	**101.88**	**136.83**	**207.23**	**369.68**			65
	36.44	72.81	109.20	182.35	349.33			

Constitution and By-Laws of the Actuarial Society of America, as Amended October 6th, 1898.

Constitution.

Art. I.—This organization shall be called "The Actuarial Society of America."

Art. II.—*Object.*

The Actuarial Society of America has for its object the promotion of actuarial science by personal intercourse, presentation of appropriate papers, discussion, and such other methods as may be found desirable.

Art. III.—*Membership.*

The membership of the Society shall consist of the subscribers and of such other persons, connected with actuarial pursuits, as shall be duly elected or admitted.

Art. IV.—*Officers.*

The officers shall consist of a President, a first and a second Vice-President, a Secretary, and a Treasurer.

Art. V.—*Council.*

The officers, with ex-presidents and six other members, shall constitute the Council. At the first election of members of Council, after the adoption of this article, two members shall be elected to serve for three years, two for two years and two for one year; and annually thereafter two members shall be elected for three years. No retiring member of the Council shall be eligible for re-election at the same meeting.

Art. VI.—*Duties of Officers and Council.*

The duties of the officers shall be such as usually appertain to their respective offices. The duties of the Council shall be in general to manage the affairs of the Society in the intervals between its meetings, to call meetings and to make arrangements for the same, to decide upon papers offered for reading and discussion, and to pass upon candidates to be presented to the Society for election.

Art. VII.—*Election of Officers and Council.*

The officers shall be elected by ballot at the annual meeting

for the term of one year. The President and Vice-Presidents shall not be eligible for the same office for more than two consecutive years.

ART. VIII.—*Meetings.*

The annual meeting of the Society shall be held on the first Thursday after the fourteenth day of May in each year. Other meetings may be called by the Council from time to time, and shall be called by the President at any time upon the written request of ten members; twenty days' notice of such meetings shall be given by the Secretary.

ART. IX.—*Associates.*

Any one twenty-one years of age, pursuing actuarial studies and looking forward to future membership, may, on the conditions hereinafter stated, be enrolled as an associate, and in such capacity may be present, without participation, at the meetings of the Society, and receive its publications. The conditions are, that he shall be nominated to the Council by at least two members of the Society; that notice of such nomination shall be given by the Secretary to each member of the Society; that, not less than twenty days after such notice has been given, his nomination shall be approved by the Council, with not more than one negative vote, and that he shall subsequently pay such examination fee and pass such preliminary examination as may be prescribed by the Council.

ART. X.—*Admission to Membership.*

Any associate, who has been such for at least one year, and is twenty-five years of age, may apply to the Council for membership. Every member of the Council shall be notified confidentially of such application at least twenty days before the meeting at which it shall be acted upon. If his application be approved by the Council he shall become a member on paying such examination fee and passing such final examination as shall be prescribed by the Council. Otherwise, no one shall be admitted as a member unless by the unanimous recommendation of the Council, followed by a unanimous ballot of the Society.

ART. XI.—*Quorum.*

Four members of the Council shall constitute a quorum. Ten members of the Society at any duly called meeting shall constitute a quorum.

ART. XII.—No resolution expressive of opinion shall be entertained at any meeting.

ART. XIII.—*Amendments.*

This Constitution may be amended by an affirmative vote of two-thirds of the members present at any meeting held at least three months after notice of such proposed amendment shall have been sent to each member by the Secretary.

BY-LAWS.

ART. I.—*Order of Business.*

At the meeting of the Society the following order of business shall be observed, unless the members vote otherwise for the time being:

1. Calling of the roll.
2. Address or remarks by the President.
3. Minutes of the last meeting.
4. The minutes of the last meeting read and passed.
5. Summary of the business transacted by the Council since the last meeting of the Society presented for its information and approval.
6. Candidates for membership considered and voted upon.
7. Reports of Committees and of Officers.
8. At annual meeting, election of Officers and Council.
9. Unfinished business; new business.
10. Reading of papers prepared for presentation to the Society.
11. Discussion of papers presented.
12. Reading of a summary of the business just transacted at the meeting for correction if necessary.
13. The Council meetings shall proceed in this order as far as it may apply to them.

ART. II. Meetings of the Council shall be called whenever the President or four members of the Council so request, but not without sending notice to each member of the Council ten or more days before the time appointed; such notice shall state the subjects intended to be brought before the meeting, and should other

matter be passed upon, any member of the Council shall have the right to re-open the question at the next meeting.

ART. III.—*Duties of Officers.*

The President, or, in his absence, the next Vice-President in order, shall preside at meetings of the Society and of the Council. At the Society meetings he shall vote only in case of a tie, but at the Council meetings he may vote in all cases.

The duties of the Secretary shall consist in keeping a full and accurate record of the proceedings at the meetings of the Society and of the Council, sending out calls for the said meetings, and, with the approval of the President and Council, carrying on the correspondence of the Society.

The Treasurer shall send out calls for annual dues and acknowledge receipt of same; pay all bills approved by the President for expenditures authorized by the Society or the Council; keep a detailed account of all receipts and expenditures, and present an abstract of the same at the annual meetings, after it has been audited by a Committee of the Council.

ART. IV.—*Dues.*

Each member shall pay ten dollars, and each associate five dollars, upon entrance, and a like amount at each annual meeting thereafter, except in the case of members not residing on this continent, who shall pay five dollars at the times stated.

It shall be the duty of the Treasurer to notify by mail any member or associate whose dues may be six months in arrear, and to accompany such notice by a copy of this article. If such member or associate shall fail to pay his dues within three months from the date of mailing such notice, the Treasurer shall report the delinquent to the Secretary, by whom his name shall be stricken from the rolls, and he shall thereupon cease to be a member or associate of the Society. He may, however, be reinstated by vote of the Council, and upon payment of arrears of dues.

ART. V.—*Amendments.*

These By-Laws may be amended by an affirmative vote of two-thirds of the members present at any meeting held at least three months after notice of the proposed amendment shall have been sent to each member by the Secretary.

Abstract from the Minutes of the Fall Meeting of the Actuarial Society of America, held in Worcester, Massachusetts, on Thursday and Friday, October 6th and 7th, 1898.

FIRST SESSION.

Directors' Room, State Mutual Life Assurance Company,
Thursday, October 6th, 11 A. M., 1898.

The meeting was called to order by the President, Mr. Bloomfield J. Miller, who, after the roll call, addressed the Society.

Gentlemen of the Actuarial Society:

In fulfillment of the obligations imposed upon me by our by-laws, I propose to open this, our twentieth semi-annual meeting, with a brief address relating principally to what I conceive to be the most important functions and duties of the actuary of a life insurance company.

It is superfluous to say that an actuary should be a good mathematician; but I am inclined to believe that he may apply his mind to the study of the higher mathematics and to the elaboration of intricate formulæ to an extent which may impair his value as a practical manager or counsellor.

The life insurance business is not one which can be conducted throughout upon absolutely correct mathematical principles. A reasonable approximation to mathematical accuracy is all that the managers of a life insurance company may hope to achieve. The very mortality table upon which the actuary's most fundamental computations are based is at best but an approximation to the truth. It is a patent fact that business secured in different sections of the country exhibits differing death rates; but it would be vain to attempt to separate the company's business into separate groups by States, or perhaps by counties, and distribute the mortality gains, or perhaps losses, according to the company's actual experience in each group. Expenses never have been, and never will be, incurred or distributed on strictly accurate mathematical principles.

The more successfully an actuary combines theoretical accuracy with practical principles of administration the greater will be his actual value to the company. His object should not be to attain an impossible standard of mathematical refinement, but he should always strive to approach as nearly to that standard as he can without interfering with the practical conduct of the business.

Classification may be overdone and produce much friction that would be avoided by approximate methods which are still substantially in accordance with equity and sound business principles. If, owing to inexperience or to the pressure of competition, wrong methods have been introduced into the conduct of the business, the first object of the actuary should be to reform those methods, rather than to distribute the inequalities resulting from them by a mathematical formula.

There has been much discussion of late as to the proper method of the distribution of expenses, and the solution of the problem is rendered very difficult by the fact that although the provision made by the companies for meeting ordinary expenses is not realized except as premiums are successively paid, the expenses incurred during the early history of a policy exceed the premium loadings for those years. It is held by some that the inequalities arising from the excessive cost of new business, which is now several times as great as it was thirty years ago, may be adjusted by considering the first year's premium as a term premium, and in effect dating and rating the regular policy one year ahead. Others, who are not prepared for such heroic treatment, are of the opinion that the excessive expenses incurred by the company without the policy-holder's knowledge or consent, should be charged against him at the outset, and that no dividends should be paid until the deficiency is made up out of his redundant premiums. Is it not possible that the better way to treat the difficulty would be to reduce initial expenses by paying only a moderate rate of commissions for new business and perhaps providing for a more liberal and lasting renewal interest? It would be very difficult for any one company to execute such a reform; but in my opinion it would not be at all difficult to do so if all the companies, or even the leading companies, would make the reform at the same time. While the companies were making seven or six, or even five per cent. upon their invested reserves, there was a much larger practical margin in the business for expenses than there will be if interest rates should continue to fall until they reach only three or four per cent. It seems to me that one of the most important services that

the actuary can render is to exercise his ingenuity to the utmost to suggest plans by which expenses may be reduced without impairing the efficiency of the company's management and the general prosperity of its business. I can remember when twenty per cent. on first premiums and five per cent. on renewals was considered by the agent as very satisfactory compensation, and produced large business results without material friction or inconvenience to the policy-holder or to the company, and I am by no means certain that the more modern methods of large first commissions and limited renewals produce results which, in the long run, are as satisfactory.

An actuary should never be governed in practical matters by a mere theory evolved out of his own mind or generally accepted by the profession, if he has the power to test that theory by reliable statistics. If statistics do not support the theory, the theory should be promptly abandoned. Such statistical researches should, whenever practicable, be communicated by the author to his brothers of the Actuarial Society, in order that they may be preserved and utilized by all.

I cannot express my idea better than by quoting the mottoes of our Society and of the English Institute of Actuaries :

"The work of science is to substitute facts for appearances and demonstrations for impressions."

"I hold every man a debtor to his profession, from the which as men, of course, do seek to receive countenance and profit, so ought they of duty to endeavour themselves by way of amends to be a help and ornament thereunto."

It is not always necessary that such statistical researches should be very elaborate or extensive in order to make them valuable to their author and to our Society. Brief and limited investigations, when confirmed by the investigations of others in the same direction, are often of even greater value than a single extensive and elaborate investigation made by one individual.

Any investigations bearing on the practical operation of cash surrender values, loans on policies, extended insurances, the comparative death rates to be expected on large insurances as compared with small, or on policies issued at extreme ages, either high or low, as compared with policies issued at the more central ages, or upon endowment policies and life policies, or upon deferred dividend policies as compared with annual dividend policies, cannot fail to be of interest and value to all actuaries who may have access to them.

I do not wish to occupy too much of your time with this address, which is only intended to be suggestive; but as an evidence of my sincerity I will communicate very briefly the results of several investigations that I have made recently into the experience on some of the above points of the company with which I am connected. That company for many years has paid cash values on application, but did not guarantee cash values until 1887, and then only guaranteed them on what it calls its "Convertible" policies. The annual dividends on such policies for the first ten years are applied to the purchase of dividend additions to the sum insured; but the guaranteed cash surrender value is at all times equal to the full American experience four per cent. reserve on the original policy, and at the end of the tenth or of any succeeding fifth policy year the guaranteed cash value includes the full reserve on all existing additions, so that at those periods the company has no surrender charge. I did not notice any exceptional tendency on the part of the holders of these "Convertible" policies to take cash values during the first nine years when the company was always able to secure a reasonable surrender charge out of the value of the dividend additions; but I was somewhat apprehensive that there might be a high percentage of surrenders at the end of the tenth year. The fact is, however, that less than five per cent. of these policies (issued in 1887) which were in force at the beginning of 1897 were surrendered in the tenth year. In 1895 the company commenced guaranteeing cash values for all its policies, extending the same guarantees to policies which were issued before that date and increasing the loan privilege from one-half of the reserve up to the full cash surrender value. I have watched carefully for any indication that this action has materially affected the persistency of the company's policies; but up to this date I have failed to see that it has done so.

I have recently made two rather brief and hasty investigations into the company's mortality experience on policies issued for more than $10,000, and policies issued at ages above sixty, with the following results:

I commenced with the year 1880 and selected every policy for more than $10,000 issued from the beginning of that year to the end of 1894. I had thus the experience of what might be called a small company fifteen years old, which had issued no policy for less than $10,000, and no policy for more than $25,000. Summing up the experience for the fifteen years, I found that the total amount of risk was equivalent to $33,520,850 for one year; that the

expected loss by the American Experience Table of Mortality had been $463,190, whereas the actual loss had been only 42.4 per cent. of the expected loss, or, $196,500.

The other investigation covered the company's experience for the years 1891 to 1896, inclusive, on all policies issued at ages above sixty and included such policies which were issued before 1891, but were in force during the whole or any part of the period covered by the examination. I found that on policies less than six years old, the expected loss by the American Experience Table had been $212,409, whereas the actual loss had been $109,650—only 51.6 per cent. of the tabular rate. The rest of the experience, being upon policies more than five years old and less than thirty-three years old, showed an actual loss equal to 99.4 per cent. of the tabular rate; the total figures, including all years of membership from the first to the thirty-second, inclusive, being as follows: Expected loss by death, $622,620; actual loss, $517,317, which was only 83.1 per cent. of the tabular rate.

The above investigations interested me and seemed to throw considerable light upon vexed questions of much importance. I submit them to you for what you may consider them worth, but, of course, do not claim that they constitute a sufficient basis for the final settlement of differences of opinion on the subjects to which they relate.

In conclusion, it is my painful duty to announce that since our meeting last April, three of our number have responded to the irresistible summons of death. Neither George Ellis, nor Joseph Hussey Sprague, nor George William Phillips will ever meet with us again. They have entered into rest, and it is for those of us who are left to endeavor to assume their professional responsibilities and duties to the best of our ability. They will be sadly missed, and their kindly, genial and estimable qualities will ever be remembered. Suitable minutes of their lives will be published in the Society's papers and transactions.

Officers and members present at the roll call and during the session:

Officers and Council—Bloomfield J. Miller, President; Oscar B. Ireland, 2d Vice-President; Israel C. Pierson, Secretary. Other members of Council—David Parks Fackler, William McCabe, William E. Starr, Elbert P. Marshall, James M. Lee, Thomas B. Macaulay. Members—James McIntosh Craig, James Camp Crawford, John Marshall Holcombe, Robert Watkinson Huntington, Jr.,

Hiram John Messenger, Walter Smith Nichols, Edward James Sartelle, William Simeon Smith, William Thomas Standen, Archibald Ashley Welch, Daniel Halsey Wells, William Dunbar Whiting, Peter Troth Wright, Walter Channing Wright, Charles Hart Angell.

The minutes of the meeting of April 28th and 29th, 1898, were approved as printed.

A summary of the business transacted by the Council was presented and approved. It was announced that the Decennial of the founding of the Society would be celebrated at the Annual Meeting beginning Thursday, May 18th, 1899, the details of arrangements to be announced later.

On the unanimous recommendation of the Council the Society by unanimous affirmative ballot elected to membership : Thomas Gans Ackland, F. I. A., F. S. S., Avalon, 71 Morland Road, Croydon, Surrey, England ; Arthur Francis Burridge, F. I. A., Hon. Secretary, Institute of Actuaries, Actuary and Secretary, Equity and Law Life Assurance Society, 18 Lincolns-Inn-Fields, London, Eng. ; Henry Cockburn, F. I. A., F. F. A., Life Manager and Actuary, North British and Mercantile Insurance Company, 61 Threadneedle Street, London, Eng. ; David Deuchar, F. I. A., F. F. A., F. R. S. E., President of the Faculty of Actuaries, General Manager and Actuary, Caledonian Insurance Company, 19 George Street, Edinburgh, Scotland ; Augustus Hendriks, F. I. A., Cor. Mem. I. A. Fr., F. S. S., Actuary, Liverpool and London and Globe Insurance Company, 7 Cornhill, London, Eng. ; Charles Daniel Higham, F. I. A., Actuary and Secretary, London Life Association, Limited, 81 King William Street, London, Eng. ; William Hughes, F. I. A., Vice-President, Institute of Actuaries, Joint Manager, Prudential Assurance Company, Holborn-Bars, London, Eng. ; William Joseph Hutchings Whittall, F. I. A., Actuary and Secretary, Clerical, Medical and General Life Assurance Society, 15 St. James's Square, London, Eng.; Ernest Woods, F. I. A., Hon. Secretary, Institute of Actuaries, Actuary, Westminster and General Life Assurance Association, 28 King Street, Covent Garden, London, Eng. ; Frank Bertrand Wyatt, F. I. A., Vice-President, Institute of Actuaries, Actuary, Clergy Mutual Assurance Society, 3 The Sanctuary, Westminster, London, Eng.

Minutes were presented concerning Messrs. Ellis, Sprague and Phillips, who have died since the last meeting. After remarks by many of the members the minutes were unanimously adopted. (See pp. 388, 389.)

Adjourned until 2.30 p. m.

SECOND SESSION.

THURSDAY, October 6th, 1898, 2.30 P. M.

The President in the chair.

The amendment to Article VIII. of the Constitution, proposed at the Annual Meeting, was adopted so as to make the first sentence read: "The annual meeting of the Society shall be held on the *first Thursday after the fourteenth day of May in each year.*"

It was voted to authorize the Secretary to purchase for the Society Library a copy of Mr. J. H. Sprague's book, "New and Improved Valuation Tables."

On motion, the Council were requested to consider and recommend a rule, if they shall deem it desirable, by which the Society shall accept the examinations of other Actuarial Institutes or Societies.

New papers were then presented as follows. (See pp. 283-317.)

The members then engaged in discussion of papers read at previous meetings. (See pp. 318-355.)

During the discussion the Society adjourned until Friday morning at 9.30.

THURSDAY, October 6th, 1898, 7 P. M.

The usual dinner of the Society was given in the large dining room of the State Mutual Restaurant. President Miller presided.

Postprandial speeches were made by General A. G. Bullock, President of the State Mutual Life Assurance Company, and by several members of the Society. The delegates made a report concerning the Second International Congress of Actuaries, and said that the Third Congress would be held in Paris in 1900, and that they had extended an invitation to hold the Fourth Congress in New York in 1903. (See p. 367.)

THIRD SESSION.

FRIDAY, October 7th, 1898, 9.30 A. M.

President Miller in the chair.

Discussion of papers was continued. Mr. Ireland offered the following resolution, which was unanimously adopted:

Resolved: That the thanks of the Society be given to the State Mutual Life Assurance Company and its officers for the generous hospitality and the very thoughtful preparations that have made our twentieth meeting a most pleasant one and have contributed so greatly to its success.

Mr. Sartelle, for the officers of the State Mutual Life Assurance Company, in reply expressed their pleasure in having had the opportunity to entertain the Society and invited the members and the ladies accompanying them to take a drive about the city and suburbs.

On motion, the Society adjourned.

ISRAEL C. PIERSON,

Secretary,

141 Broadway, New York.

INTERNATIONAL CONGRESS OF ACTUARIES,

HELD IN LONDON, 1898, MAY 16TH, 17TH, 18TH, 19TH AND 20TH.

The Congress met at 10.30 A. M. on each of the above-mentioned days at the Hall of the Institute of Actuaries, Staple Inn Hall, Holborn, London, W. C.

OFFICERS OF THE CONGRESS.

PRESIDENT.

THOMAS EMLEY YOUNG, B. A. (President of the Institute of Actuaries), Actuary of the Commercial Union Assurance Company, Limited, 24, 25 and 26 Cornhill, E. C.

HONORARY VICE-PRESIDENTS.

BELGIUM.—Mons. De Smet de Naeyer, Prime Minister.

FRANCE.—Mons. Boucher, Minister of Commerce, etc.
Mons. Lebon, Minister for the Colonies.

Great Britain.—The Rt. Hon. Sir Michael Hicks-Beach, Chancellor of the Exchequer.

The Rt. Hon. Charles T. Ritchie, President of the Board of Trade.

The Rt. Hon. Lord Kelvin.

The Rt. Hon. The Lord Mayor of London.

The Rt. Hon. Sir John Lubbock, Bart., M. P.

The Rt. Hon. Leonard Courtney, M. P.

Holland.—Mons. Le Docteur N. G. Pierson, LL. D., Minister of Finance.

Italy.—Signor Luzzatti, Minister of Finance.

Spain.—Mons. Sigismond Moret Y Prendergast, Colonial Minister.

United States.—His Excellency John Hay, Ambassador to London.

Vice-Presidents and Secretaries.

Belgium.—*Vice-President*, Am. Begault (Membre agrégé de l'Association des Actuaires Belges), Sous-Directeur et Actuaire de la Cie. Belge d'Ass. Générales sur la vie, Brussels.

Secretary, Léon Duboisdenghien (Secretaire de l'Association des Actuaires Belges), Secretaire du Directeur-Général et Actuaire de la Caisse Générale d'Epargne et de Retraite, Brussels.

France.—*Vice-President*, Léon Marie, Actuaire de la Compagnie le Phenix, 32 Rue Jouffroy, Paris.

Secretary, Albert Quiquet, Actuaire de la Cie. la Nationale, 92 Boulevard St. Germain, Paris.

Germany and Austria.—*Vice-President*, Dr. Gerkrath, Nordstern Life Ins. Soc., Kaiserhofstr., No. 3, Berlin, W.

Secretary, Dr. Grosse, Goltzstrasse 28 III., Berlin, W.

GREAT BRITAIN.—*Vice-Presidents*, Henry William Manly (Vice-President of the Institute of Actuaries), Actuary of the Equitable Life Assurance Society, Mansion House Street, E. C.

David Deuchar, F. R. S. E. (President of the Faculty of Actuaries in Scotland), Manager and Actuary of the Caledonian Insurance Company, 19 George Street, Edinburgh.

Secretaries, Arthur Francis Burridge, F. S. S. (Joint Honorary Secretary of the Institute of Actuaries), Actuary and Secretary of the Equity and Law Life Assurance Society, 18 Lincoln's Inn Fields.

Frank Bertrand Wyatt (Joint Honorary Secretary of the Institute of Actuaries), Actuary of the Clergy Mutual Assurance Society, 2 and 3, The Sanctuary, S.W.

HOLLAND.—*Vice-President*, Dr. C. Paraira, Nederland Ass. Co., Amsterdam.

Secretary, Dr. R. H. Van Dorsten, Nationale Levensverzekering Bank, Rotterdam.

ITALY.—*Vice-President*, Batt. Gino Sestilli, Attuario della Compagnia d'Assicurazione d'Milano.

NORWAY, SWEDEN AND DENMARK.—*Vice-President*, Dr. T. N. Thiele, Observatoriet, Copenhagen, K.

RUSSIA.—*Vice-President*, S. De Savitch, Povarskoi per, 13, St. Petersburg.

Secretary, J. Lefteiew, Gr. Morskaja, No. 37, St. Petersburg.

SWITZERLAND.—*Secretary*, Dr. G. Schaertlin, Société Suisse d'Ass. Générales sur la vie humaine, Zurich.

UNITED STATES.—*Vice-President*, Emory McClintock, Mutual Life Insurance Company of New York.

Secretary, Israel C. Pierson, Actuary of the Washington Life Insurance Company, New York.

List of Delegates.

Delegates of the Actuarial Society of America.

Macaulay, T. B., Actuary of the Sun Life Assurance Company, Montreal, Canada.

McClintock, Emory (Vice-President of the Congress for the United States), Mutual Life Insurance Company of New York, N. Y.

Nichols, Walter S., *The Insurance Monitor*, New York, N. Y.

Pierson, Israel C. (Secretary of the Congress for the United States), Actuary of the Washington Life Insurance Company, New York.

Delegates of the Association des Actuaires Belges.

Adan, H. (President of the Association des Actuaires Belges), Directeur-Général de la Compagnie d'Assurances, La Royale Belge, Brussels.

Begault, Am. (Vice-President of the Congress for Belgium; Membre agrégé de l'Association des Actuaires Belges), Sous-Directeur et Actuaire de la Compagnie Belge d'Ass. Générales sur la vie, Brussels.

Duboisdenghien, Léon (Secretary of the Congress for Belgium; Secretaire de l'Association des Actuaires Belges), Secretaire du Directeur-Général et Actuaire de la Caisse Générale d'Epargne et de Retraite, Brussels.

Hankar, F. (Membre agrégé de l'Association des Actuaires Belges), Premier Directeur a la Caisse Générale d'Epargne et de Retraite, Brussels.

Lepreux, O. (Vice-President de l'Association des Actuaires Belges), Directeur-Général de la Caisse Générale d'Epargne et de Retraite, Brussels.

Delegates of the Ministry of Commerce in Paris.

Fontaine, Arthur, Sous-Directeur de l'Office du Travail, 80 Rue de Varennes, Paris.

Weber, Louis, Actuaire de l'Office du Travail, 12 Rue Cauchois, Paris.

Delegate of the Minister of Finance in Paris.

Jobit, M., Sous-Inspecteur de l'Enregistrement, 106 Rue de Miromesnil, Paris.

Delegates of the Institut des Actuaires Francais.

Cohen, Jules, Actuaire de la Caisse Paternelle et Confiance, 1 Rue de Lille, Paris.

Marie, Léon (Vice-President of the Congress for France), Actuaire de la Compagnie le Phenix, 32 Rue Jouffroy, Paris.

Quiquet, Albert (Secretary of the Congress for France), Actuaire de la Compagnie la Nationale, 92 Boulevarde St. Germain, Paris.

Delegate de la Caisse des Depots et Consignations.

Patel, Georges, Attache a la Caisse des Depots et Consignations, 56 Rue de Lille, Paris.

Delegates of the Dutch Society of Actuaries.

Landre, Corneille L., Algemeene Maatschappij van Lebensverzekering en Lijfrente, Amsterdam.

Paraira, Dr. C. (Vice-President of the Congress for Holland), Nederland Assurance Company, Amsterdam.

Van Dorsten, Dr. R. H. (Secretary of the Congress for Holland), Nationale Levensverzekering Bank, Rotterdam.

Delegate of the Minister of Finance in Russia.

De Savitch, S. (Vice-President of the Congress for Russia), Povarskoi per, 13, St. Petersburg.

Delegate of the Minister of Communication in Russia.

Yermoloff, A.

Members of Congress from the United States and Canada.

Alsop, David G., Assistant Actuary, Provident Life and Trust Company, Philadelphia, Pa.

Bradshaw, T., Imperial Life Assurance Company of Canada, Toronto, Ontario.

Brinkerhoff, J. J., Actuary, Insurance Department, Springfield, Ills.

Cushman, E. W., Miss, Actuary, Insurance Department, Boston, Mass.

De Boer, Joseph A., Actuary, National Life Insurance Company, Montpelier, Vt.

Fackler, David Parks, Consulting Actuary, 35 Nassau Street, New York, N. Y.

Gore, John K., Actuary, Prudential Insurance Company, Newark, N. J.

Hann, Robert G., Second Assistant Actuary, Equitable Life Assurance Society of the United States, New York, N. Y.

Hendry, William, Manager, Ontario Mutual Life Insurance Company, Waterloo, Ontario.

Huntington, Robert W., Jr., Actuary, Connecticut General Life Insurance Company, Hartford, Conn.

Ireland, Oscar B., Actuary, Massachusetts Mutual Life Insurance Company, Springfield, Mass.

Junkin, J. F., Secretary, Manufacturers' Life Insurance Company, Toronto, Ontario.

Kyle, Christopher, New York Life Insurance Company, New York, N. Y.

Lee, James M., Actuary, Berkshire Life Insurance Company, Pittsfield, Mass.

Lunger, John B., Managing Actuary, New York Life Insurance Company, New York, N. Y.

Macaulay, T. B., Actuary, Sun Life Assurance Company, Montreal, Canada.

MacDonald, W. C., Actuary, Confederation Life Insurance Company, Toronto, Ontario.

Marshall, Elbert P., Actuary, Union Central Life Insurance Company, Cincinnati, Ohio.

McCabe, William, Actuary, North America Life Assurance Company, Toronto, Ontario.

McClintock, Emory (Vice-President of the Congress for the United States), Mutual Life Insurance Company of New York, N. Y.

Miller, Bloomfield J., Actuary, Mutual Benefit Life Insurance Company, Newark, N. J.

Nichols, Walter S., *The Insurance Monitor*, New York, N. Y.

Nitchie, Joseph H., National Life Insurance Company of the United States, Chicago, Ills.

Peiler, Max. H., Ætna Life Insurance Company, Hartford, Conn.

Pierson, Israel C. (Secretary of the Congress for the United States), Actuary, Washington Life Insurance Company, New York, N. Y.

Phillips, George W., Actuary, Equitable Life Assurance Society of the United States, New York, N. Y.

Ramsay, A. G., F. S. S., Canada Life Assurance Company, Hamilton, Ontario.

Richter, John G., Actuary, London Life Insurance Company, London, Ontario.

Rose, Douglas H., Maryland Life Insurance Company, Baltimore, Md.

Sanders, George W., Actuary, Michigan Mutual Life Insurance Company, Detroit, Mich.

Smith, William S., Actuary, John Hancock Mutual Life Insurance Company, Boston, Mass.

Standen, William T., Actuary, United States Life Insurance Company, New York, N. Y.

St. John, Howell W., Actuary, Ætna Life Insurance Company, Hartford, Conn.

Tatlock, John, Jr., Assistant Actuary, Mutual Life Insurance of New York, N. Y.

Weeks, Rufus W., Actuary, New York Life Insurance Company, New York, N. Y.

Welch, Archibald A., Actuary, Phœnix Mutual Life Insurance Company, Hartford, Conn.

Wells, Daniel H., Actuary, Connecticut Mutual Life Insurance Company, Hartford, Conn.

Whiting, William D., Consulting Actuary, 261 Broadway, New York, N. Y.

Wing, Asa S., Actuary, Provident Life and Trust Company, Philadelphia, Pa.

Woodward, George B., Secretary, Metropolitan Life Insurance Company, New York, N. Y.

Wright, Walter C., Actuary, New England Mutual Life Insurance Company, Boston, Mass.

ACTA.

Monday, May 16th.

(1) Election of President.

(2) Election of Vice-Presidents and Secretaries.

(3) Inaugural Address by the President.

(4) Discussion on the following Communications submitted, viz.:

(*a*) On Graduation. By Dr. J. Karup.

(*b*) On the Theory of the Limits to be held by Life Offices. By Mr. Corneille Landré.

(*c*) On the Calculation of Surrender Values. By Mr. S. Savitch.

(*d*) On the Mortality in the British Navy and Army. By Mr. J. J. McLauchlan.

(*e*) On the Rates of Mortality in Australia and New Zealand. By Mr. David Carment.

(*f*) On Life Assurance by the Caisse Générale d'Epargne et de Retraite of Belgium. By Mr. Fl. Hanker.

(*g*) On Limitations of the System of Net Valuations. By Mr. Walter S. Nichols.

(*h*) On the Influence on the Prosperity of Life Offices of Valuations, taking Account of Expenses of Management. By Mr. E. W. Scott.

Monday Evening.

Reception given by the Lord Mayor and Lady Mayoress at the Mansion House.

Tuesday, May 17th.

Consideration of the question of Legislation in relation to Life Assurance, viz.:—The General Principles of the Laws which Regulate Life Assurance Contracts and the Constitution of Assurance Companies.

Discussion of the following Communications submitted on the above subject, viz.:

(*a*) On Life Assurance Legislation in Australasia. By Mr. Richard Teece.

(*b*) On State Life Insurance in New Zealand. By Mr. J. H. Richardson.

(*c*) Summary of the Law with respect to Life Insurance in New Zealand, outside that regulating the Government Insurance Department. By Mr. J. H. Richardson.

(*d*) Legislation affecting Life Assurance Contracts and Life Assurance Companies in Cape Colony. By Mr. James McGowan.

(*e*) On Various Laws relating to the Life Assurance Contract from the International point of view. By Mr. H. Adan.

(*f*) On Life Assurance Legislation in France. By Mr. L. Massé.

(*g*) On Insurance Legislation in the German Empire, 1895—1897. By Dr. Karl Samwer.

(*h*) On Life Assurance Legislation in Holland. By Mr. J. F. L. Blankenberg.

(*i*) On Life Assurance Legislation in Russia. By Mr. M. Ostrogradsky.

(*j*) On Legislation in its Commercial and Economical bearing on Life Assurance, from the National and the International points of view. By Charles Le Jeune.

(*k*) On Legislation as affecting the Life Assurance Contract in the United Kingdom. By Mr. Arthur R. Barrand.

Tuesday Afternoon.

Luncheon given by the Directors of the Prudential Assurance Company in their building.

Wednesday, May 18th.

Consideration of the position of Friendly Societies in various Countries.

Discussion of the following Communications submitted on the above subject, viz. :

(*a*) On Mutual Aid Friendly Societies in Belgium. By Mr. L. Duboisdenghein.

(*b*) On Friendly Societies in France. By Mr. J. Cohen.

(*c*) On Friendly Societies in Germany. By Mr. Unger.

(*d*) On Friendly Societies in Holland. By Mr. J. van Schevichaven.

(*e*) On Friendly Societies in Russia. By Mr. S. de Savitch.

(*f*) On Friendly Societies in Spain. By Dr. J. Maluquer y Salvador.

(*g*) On the Legal Organization of Friendly Societies in the United Kingdom. By E. W. Brabrook, C. B.

(*h*) On the Relation which should exist between the State and Non-Collecting Friendly Societies. By Mr. P. L. Newman.

(*i*) On Friendly Societies in Cape Colony. By Mr. J. McGowan.

(*j*) On Friendly Societies in New Zealand. By Mr. George Leslie.

Wednesday Evening.

Dinner by the President and Members of the Institute of Actuaries Club at Star and Garter Hotel, Richmond.

Thursday, May 19th.

(1) Consideration of the question of a Universal Actuarial Notation.

Discussion of the following Communications submitted on the above subject, viz. :

(*a*) On Universal Actuarial Notation. By Mr. Am. Bégault.

(*b*) On Universal Actuarial Notation. By Mr. George King.

(2) Consideration of a proposal for an International Actuarial Dictionary, and Discussion of a Communication thereon made by Mr. A. Quiquet.

(3) Consideration of the question of Compensation to Workmen for Accidents.

Discussion of the following Communications made on the above subject, viz. :

(*a*) Compensation for Workmen's Accidents in Belgium. By Mr. Louis Maingie.

(*b*) Actual Position of the question of Workmen's Accidents in France. By Mr. Louis Weber.

(*c*) Workmen's Accidents in Germany. By Mr. Unger.

(*d*) Workmen's Accidents in Spain. By Dr. J. Maluquer y Salvador.

(*e*) The law relating to Workmen's Accidents in the United Kingdom. By Mr. Stanley Brown.

(*f*) On the Position of Workmen in Cape Colony in regard to Legal Compensation for Injuries. By Mr. James McGowan.

(*g*) On Compensation to Workmen for Accidents in Russia. By Mr. A. Pokotiloff.

THURSDAY EVENING.

Reception by the President and Council of the Institute of Actuaries in the Galleries of the Royal Institute of Painters in Water Colors.

FRIDAY, MAY 20TH.

(1) Consideration of the question of Old Age Pensions.

Discussion of the following Communications submitted on the above subject, viz. :

(*a*) Old Age Pensions in Belgium. By Mr. O. Lepreux.

(*b*) Old Age Pensions in France. By Mr. H. Duplaix.

(*c*) Old Age Pensions in Germany. By Mr. Unger.

(*d*) Old Age Pensions in Russia. By Mr. S. de Savitch.

(*e*) On the Solution of Problems which frequently arise out of the Rules of Pension Funds and Friendly Societies. By Mr. H. W. Manly.

(2) Consideration of the question of the Year and Place of the next International Actuarial Congress.

(3) Votes of thanks.

(*a*) To the Honorary Vice-Presidents.

(*b*) To the Contributors of Papers.

(*c*) To the President and Officers.

At the close of the Meeting on Friday, a photograph of the Congress was taken.

Friday Evening.

Institute of Actuaries, Jubilee Dinner at the Holborn Restaurant.

Saturday Morning.

Excursion to Windsor.

Members

OF THE

Actuarial Society of America

Who Have Died

since the founding of the Society, April 25th, 1889,
to October 6th, 1898,

WITH THEIR

Official Standing and Connection

AT THE

Date of Death.

SAMUEL NEWELL STEBBINS, Charter Member

Actuary, Manhattan Life Insurance Company, New York
Born, Longmeadow, Massachusetts, April 16th, 1819
Died, Brooklyn, New York, August 26th, 1889

The *New York Tribune* of August 29th, 1889, contained the following item:

ACTUARIAL SOCIETY.—STEBBINS.—At a meeting of the Council of the Actuarial Society of America, held August 28th, 1889, it was resolved,

That this Society learns with regret of the death of Samuel N. Stebbins, one of its original members, whose warm heart and broad mind, despite his advanced age, had kept him young in spirit and led him to take a warm interest in the formation of the Actuarial Society.

ISRAEL C. PIERSON, Secretary.
DAVID PARKS FACKLER, First Vice-Pres't.

Mr. Stebbins was born at Longmeadow, Mass., April 16th, 1819, and when quite a lad moved to the vicinity of Rochester, N. Y., with his father, where he remained until old enough to go into business. After a few years of business in Rochester, he came to New York, which place, with the exception of Chicago for a short time, he made his home until his death, August 26th, 1889. He was appointed Actuary of The Manhattan Life Ins. Co. in the early part of 1860, and remained in that position until his death.

EDWARD BUCKEY SMITH, A. M., Charter Member

Actuary, Life Insurance Company of Virginia, Richmond, Va.
Born, Leesburgh, Va., October 14th, 1833
Died, Richmond, Va., July 31st, 1890

AT the Fall meeting of the Actuarial Society of America held at Hartford, Conn., October 23d, 1890, the President, Mr. Sheppard Homans, said:

"Since our last meeting, gentlemen, one of our members, Prof. E. B. Smith, of Richmond, Va., has gone to join the majority. Prof. Smith was known to most of us. He read a paper at one of our previous meetings. I had known him for some twenty years. He was born about sixty years ago in Loudon County, Va., and graduated at the head of his class in the University of Virginia. Soon after graduation he was appointed Assistant Professor in

that University, which position he held until the breaking out of the war, when he joined the Confederate Army, and fought gallantly throughout the whole of the war, and at the close he was Lieutenant-Colonel of Ordnance. Immediately after the war he was appointed Professor of Mathematics in Richmond College, Richmond, Va., and held that position up to the time of his death. He was a very accomplished mathematician, and was greatly beloved by the professors and students of that college, and his loss was a great one. He was Actuary of the Piedmont and Arlington Company for a number of years, until that company went into liquidation, and soon afterward was appointed Actuary of the Life Insurance Company of Virginia, which office he held until his death. Mr. Smith was one of the most popular men that I knew. He was beloved in all walks of life, and I think it is very proper that a minute of his death should be entered on our records."

EDMOND-AUGUSTE COSMAO-DUMANOIR. Elected April 28th, 1893
Vice-President of the "Institut des Actuaires Français"
Actuary, "Compagnie La Nationale," Paris, France
Born, Lorient, France, July 15th, 1830
Died, Paris, France, November 26th, 1894

EDMOND-AUGUSTE COSMAO-DUMANOIR was born July 15th, 1830, at Lorient, France, where his father, holding the rank of Rear-Admiral, exercised the important functions of Maritime Prefect. He graduated at "L'Ecole Polytechnique" in 1850, with the rank of Ensign. He served in the army for eighteen years, in Algeria and elsewhere, became a Captain and received the cross of the Legion of Honor. In 1868 he resigned his commission, and accepted the Actuaryship of "La Nationale," one of the oldest and largest of the French Life Companies. He was thus one of the three or four earliest Actuaries in France.

At the Paris Exposition of 1889 M. Cosmao-Dumanoir was awarded a gold medal as one of the committee in the preparation of tables of mortality, A. F. and R. F. On January 19th, 1893, he was made Vice-President of l'Institut des Actuaires Francais, of which he was one of the founders. On April 28th, 1893, he was elected a member of the Actuarial Society of America.

He died on November 28th, 1894. His loss is greatly felt by his associates, both because of his abilities and of his rare personal qualities, which endeared him to the hearts of all.

HORACE COOPER RICHARDSON. Elected October 3d, 1889

Associate Actuary, New York Life Insurance Company, New York
Born, McMinnville, Tennessee, February 26th, 1852
Died, Brooklyn, New York, February 12th, 1895

HORACE COOPER RICHARDSON was born at McMinnville, Tennessee, February 26th, 1852. In the year 1865 he came to New York City and entered the employ of the dry-goods firm of S. B. Chittenden & Co., where he remained a few years. He then returned to school for a time, and on November 23d, 1869, became connected with the Mathematical Department of the New York Life Insurance Company, and was, in course of time, placed in charge of the clerical force of that department. He was a close observer of cause and effect, and this fact, with his long experience in the company's service, gave him a minute and comprehensive knowledge of the business of the company. In 1892 he was appointed Assistant Actuary and, later, Associate Actuary. He was a member of the Actuarial Society of America.

He died on February 12th, 1895, his wife and his daughter, 7 years of age, surviving him. His associates in the New York Life office, as well as the many friends he left, will feel his removal long and deeply.

CHARLES BENJAMIN PERRY. Elected April 24th, 1890

Second Assistant Actuary, Mutual Life Insurance Co., New York
Born, Delhi, New York, July 1st, 1835
Died, Delhi, New York, August 23d, 1895

CHARLES BENJAMIN PERRY died on August 23d, 1895, at Delhi, New York, the place of his birth. He was educated in the schools of his native town, and after a short business experience in a bank he came to New York and entered the employment of S. B. Chittenden & Company. In 1861 he was appointed to a position on the staff of the navy in the paymaster's department, and served for more than two years with the blockading fleets in the Gulf and on the Carolina coast.

In November, 1868, Mr. Perry became connected with the Actuary's Department of the Mutual Life Insurance Company of New York, and in March, 1889, he was appointed Second Assistant Actuary. A record of nearly twenty-seven years of faithful service in that connection covers the period of his ma-

ture manhood. He was of a quiet and retiring disposition, but of great depth of feeling and warmly attached to his friends and intimate business associates. A devoted father, he found in his life with his children his greatest interest and enjoyment, and the picture of his home life was a most pleasing one.

He was elected a member of this Society on April 24th, 1890.

LÉON MAHILLON. Elected October 10th, 1895

President First International Congress of Actuaries
Director General of the "Caisse Générale d'Epargne et de Retraite"
Born, Molenbeek, St. Jean, Belgium, April 26th, 1854
Died, Brussels, Belgium, January 19th, 1896

BECOMING a member of this Society on October 10th, 1895, M. Mahillon died on January 19th, 1896, and thus within three short months the Society gained and lost its most shining ornament.

His crowded history is yet too brief: a military education of the first-class; a period of service as Captain of Engineers; a professorship in the Military School of Belgium; much and highly distinguished work as a writer and editor; six years as what might be called Government Actuary of Belgium; the almost miraculous organization and consummately skillful guidance of the first International Congress of Actuaries in 1895; and then, at the age of 41, the sudden end.

As an actuary, besides his duties in supervising the Belgian government's *Caisse d'Epargne et de Retraite*, he occupied himself with the more serious social problems of the time, and various organizations for the well-being of the artisan and the farming classes are the results of his humane and well-directed energy. It was with his encouragement that M. Bégault carried through the French translation of the Text-Book of the Institute; and it was again due to his tact and determination that the Congress was finally brought to a unanimous agreement upon the proposal of M. Bégault for the general adoption of the notation of the Institute of Actuaries. In addition to his talent, his acquirements, his activity, that which was perhaps the most distinguishing feature of his character was a personal magnetism and enthusiasm for high ideals which attracted and charmed all with whom he had to do. His many friends in various countries have borne instant and heartfelt testimony to the strength of the attachment which he had inspired in them and to the depth of their sense of loss.

JACQUES MARTIN-DUPRAY, Cor. Mem. A.A.Belg. Elected April 28th, 1893
Vice-President of the "Institut des Actuaires Francais"
Actuary, "Compagnie d'Assurances Générales," Paris, France
Born, Paris, France, December 6th, 1845
Died, Paris, France, September 12th, 1897

JACQUES NICOLAS MARTIN-DUPRAY, a member of this Society, died at his residence in Paris on September 12th, 1897. M. Martin-Dupray was an actuary of unusual distinction, taking a prominent part in the management not only of his own company, the Assurances Générales, one of the largest in Europe, but also, in advice and consultation, of other important companies, and being at the time of his death Vice-President of the Institute of French Actuaries, as well as an honored member of various actuarial bodies in other countries.

M. Martin-Dupray was born in Paris on December 6th, 1845, and has been connected with the "Compagnie d'Assurances Générales" since 1866, becoming its actuary in 1878. In 1889 he received, from the jury of the international exhibition of that year, a gold medal for his work in connection with the French mortality tables, and about the same time he obtained also the distinction of "Officier d'Academie." He had previously received a decoration from the government of Portugal—the cross of the Order of Christ—for a report which he had made on the subject of the Portuguese finances. He was also prominent in philanthropic matters, being an officer of two benevolent institutions at the time of his death. His health was not robust, but his final illness was brief and the announcement of his death came as an unexpected distress to his wide circle of friends in all countries.

SHEPPARD HOMANS, Cor. Mem. I. A., Charter Member
(Member of Council, Ex-President.) Consulting Actuary
Born, Baltimore, Maryland, April 12th, 1831
Died, New York, January 8th, 1898

BY the death of Sheppard Homans the Actuarial Society of America has lost one of its most esteemed and respected members. The Society desires to express its high appreciation of him as a citizen, as an insurance man, and as a distinguished member of the Society, of which he was the first President.

Mr. Homans was born in Baltimore, Md., in 1831. He entered Harvard University in 1849, and soon became distinguished by his mathematical and scientific attainments, and, while still a student, the United States Government called him to Coast Survey Service, and, subsequently, appointed him astronomer for several exploring expeditions. On the death of Prof. Gill, in 1855, Mr.

Homans was appointed actuary of the Mutual Life Insurance Company of New York, and was soon recognized as one of the foremost actuaries of the world. In 1864 and 1865 Mr. Homans perfected the American Experience Table of Mortality, which was based upon the experience of the Mutual Life Insurance Company (published 1859), but was modified and adjusted by a comparison with the experience of English companies. This table of mortality has proved to be an admirable exponent of the mortality prevailing among American insured lives. In 1862 Mr. Homans recommended the distribution of life insurance surplus upon the "contribution" plan, by which surplus would be distributed among different classes of policies substantially in proportion to the contribution of each class to the general surplus. This method was immediately adopted by the Mutual Life Insurance Company, and, within a few years, was adopted by all of the other American life insurance companies. Mr. Homans' innate nobility of character was shown by the frank manner in which he shared with a former subordinate the great credit which this new dividend system brought him.

Mr. Homans' services in the cause of life insurance would have been preëminent if they had been limited to the matters above referred to, but his subsequent contributions to the welfare of the business were numerous and valuable. He was corresponding member of the English Institute of Actuaries, and enjoyed a world-wide reputation and respect.

Mr. Homans resigned from the Mutual Life in 1871, and, in 1875, organized the Provident Savings Life Assurance Society of New York, of which he was President until 1895, when he resigned, and accepted the appointment of consulting actuary.

For some time previous to his death, which occurred suddenly on January 8th, 1898, Mr. Homans was much interested in the subject of National Supervision of Life Insurance Companies. He prepared a very able brief, in which he presented the propriety and importance of regarding life insurance as a form of interstate commerce, and advocated the regulation thereof by the general government, instead of by the several state governments. At the time of his death he was actively employed in urging Congressional action looking to national supervision.

It would be difficult to name a man who had fewer enemies and more friends than Mr. Homans. His death is felt by his associates to be not only a great loss to the Society, but a great personal bereavement to its members. He will be missed socially as much as officially, and his genial, kindly personality will abide in the heart of each member of this Society.

It was resolved at the meeting of the Actuarial Society of America, held April 28th, 1898, to forward a copy of this minute to the family of Mr. Homans, and to incorporate it in the transactions of the Society.

HENRY WORTHINGTON SMITH, A. M., Charter Member

(Ex-Member of the Council.) Editor Insurance Register, Philadelphia, Pa.

Born, Hadley, Massachusetts, March 2d, 1836

Died, Moore, Pennsylvania, February 3d, 1898

THERE is sadness in our hearts for another member gone before. Henry Worthington Smith, a charter member of this Society, died at his residence —Moore, near Philadelphia, Pa.—on February 3d, 1898, aged sixty-two years. He was born at Hadley, Mass., was graduated at Amherst College in 1859 as A. M., and shortly thereafter taught school for a time in the South. Later he became identified with the life insurance business as an agent, his fields of labor being in the New England States. On account of his mathematical attainments his attention was naturally drawn to the scientific side of the business, and, as a result, he became successively engaged with the Hope Mutual, New Jersey Mutual, and the American Life Insurance Companies in an actuarial capacity. He was also an active contributor to the columns of the insurance journals, and his work in this direction was uniformly that of the thinker and accomplished writer as well as the life insurance expert. His later years were spent in editing an insurance journal which he founded, and not until his failing health forced him to do so, did he relinquish his labors and cease his busy life. He was a graduate of the Law Department of the University of Pennsylvania, and a member of the Philadelphia and Delaware County Bars, also a member of the Union League Club of Philadelphia. He leaves a devoted wife and daughter, upon whom his loss falls heavily; but to him the end came peacefully as a dream.

GEORGE ELLIS, Charter Member

Actuary and Secretary, Travelers' Insurance Company, Hartford, Conn.

Born, Hartford, Connecticut, September 27th, 1843

Died, Hartford, Connecticut, June 25th, 1898

THE death of George Ellis closed an honorable and successful career; the Actuarial Society of America has lost a charter member universally esteemed. Born in the city of Hartford, Conn. (a lineal descendant of William Bradford, second Governor of Plymouth Colony), young Ellis completed his early education in its public schools; matriculated at Trinity College, but sacri-

ficed his baccalaureate degree to join, in 1861, the host of youthful enthusiasts who relinquished the pleasures and pregnant opportunities of collegiate life to engage in war for the maintenance of the Union.

Retiring from the U. S. Navy in 1868, he adopted the virile profession of civil engineering, and earned an enviable reputation by its practice in the new and expanding settlements of the Northwest.

Returning later to the city of his birth, Mr. Ellis was appointed actuary of the Travelers' Insurance Company ; he easily gained recognition as a leading expert in the theory and practice of accident insurance, and exhibiting marked ability in executive affairs, was, in consequence, unanimously elected its secretary and a director, positions which he held at the time of his death.

A Democrat of earnest convictions, he was, notwithstanding, appointed a police commissioner by a Republican Mayor of his native city, and held the office continuously under successive administrations of both political parties.

He was a director in two of the principal banks (Savings and National) of Hartford, and a fellow of the Connecticut Historical Society, an association of prominent people given to scholarly habits.

It is not, however, the success which crowned his professional and personal activities that the friends of George Ellis will longest remember, but rather certain traits of high character expressed in daily conduct, and lending a color of dignity to his demeanor, and with a favored few will ever abide the memory of the courage, serenity and faith which illumined his closing hours to the end.

JOSEPH HUSSEY SPRAGUE, A. B. Elected October 3d, 1889

Ætna Life Insurance Company, Hartford, Conn.
Born, Greenfield, Massachusetts, March 8th, 1829
Died, Hartford, Connecticut, July 21st, 1898

FOR the fourth time within the period of seven months has the resident membership of the Actuarial Society been diminished by death.

Joseph Hussey Sprague (the subject of this brief memorial sketch) was born in Greenfield, Mass., a descendant of an early colonial family resident in the historic town of Salem.

He was a graduate of Harvard University in the class of 1851, and attained, through a high grade of scholarship, an election to the noted Phi Beta Kappa Society.

During his long residence in Hartford, Mr. Sprague was an active participant in both business and politics, serving with fidelity and success in the

legislative and executive departments of the city, holding the office of Mayor for two consecutive terms, and the chairmanship of its Board of Street Commissioners for a period of ten years. As a member of the General Assembly of the State of Connecticut he framed the most important legislation of the season conserving the interests of life and fire insurance.

He acquired a reputation for marked ability as an underwriter in the business of fire insurance, but it was in the domain of life insurance that he found a congenial field for the employment of his admirable mathematical attainments, and while actuary of the insurance department of Connecticut he developed its technical functions to the conditions of maturity.

Intolerant of crudeness in all mathematical work, he early adopted refined methods of analysis, and computed with exceeding ingenuity and precision extended series of policy values, based upon the *continuous* theory of mortality and interest, and this valuable contribution was received with much approval by prominent actuaries in Great Britain, including the distinguished mathematician and writer, W. S. B. Woolhouse.

Keenly discriminating in his estimate of men, measures and events, he was considerate in forming and expressing individual convictions, and inflexibly faithful to the claims of friendship as well as the demands of personal and official obligations.

The death of Joseph Hussey Sprague, startling in its suddenness, severed ruthlessly the ties of family affection, and deprived the Actuarial Society of America of a zealous and gifted member.

GEORGE WILLIAM PHILLIPS, A. M., Charter Member

(1st Vice-President.) Actuary, Equitable Life Assurance Society, New York

Born, Salem, Massachusetts, November 27th, 1827

Died, Rocky Hill, New Jersey, September 27th, 1898

THE fifth member of the Society to die this calendar year, Mr. Phillips, its First Vice-President, is the first officer of the Society who has deceased during his official term. He was born at Salem, Massachusetts, November 27th, 1827, and died at Rocky Hill, N. J., suddenly, of heart disease, September 27th, 1898, aged seventy years and ten months. Coming of the sturdy original Puritan stock, he looked so hale and vigorous at the annual meeting in April that none dreamed he would not be with us at the fall gathering of the Society.

He graduated at Harvard in 1847—the sixth generation of his family that had done so—but, though descended from such excellent ancestry and highly educated and erudite himself, his manners were as simple and unconventional as those of a country squire.

After graduation he engaged in civil engineering, until 1859, when he was appointed actuary of the Equitable Life Assurance Society of the United States, at the recommendation of Professor Pierce, the distinguished mathematician of Harvard.

During some years his official duties called him abroad, but he showed much interest in the affairs of the Actuarial Society, and was an active member of the Committee on Examinations in the spring of 1898.

His contributions to the Society's discussions were very interesting and instructive, but as he frequently requested that his remarks should not be printed, only partial records of them have been preserved.

Though ordinarily reserved in mien, he became genial and kindly on fuller acquaintance, and with his great abilities and conscientious work won the esteem of all. His share in the upbuilding of the Equitable will be his enduring monument.

Resolved: That a copy of this minute be forwarded to his wife (whose presence added pleasure to our fall meeting in 1897), with our sincere sympathies, as a testimony of the Society's regret for our common loss.

SAMUEL NEWELL STEBBINS

EDWARD BUCKEY SMITH

EDMOND-AUGUSTE COSMAO-DUMANOIR

HORACE COOPER RICHARDSON

CHARLES BENJAMIN PERRY

LÉON MAHILLON

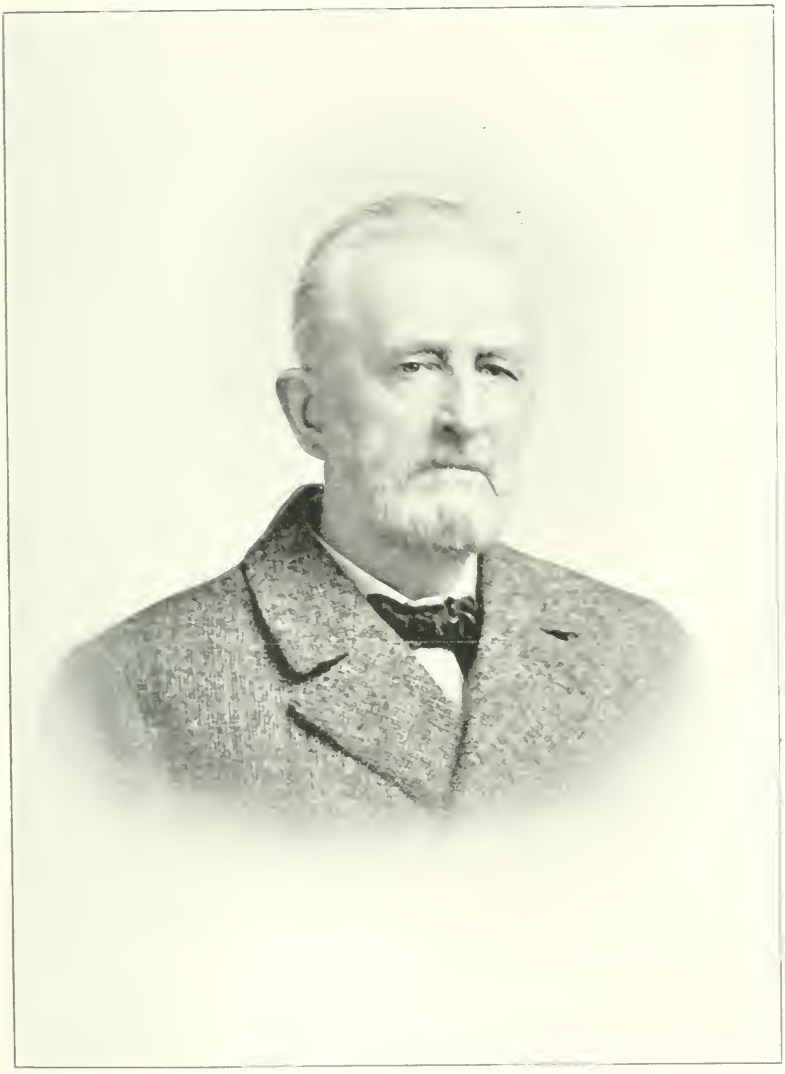
JACQUES MARTIN-DUPRAY

SHEPPARD HOMANS

HENRY WORTHINGTON SMITH

GEORGE ELLIS

JOSEPH HUSSEY SPRAGUE



GEORGE WILLIAM PHILLIPS

INDEX TO VOLUME V.

PAGE

ABSTRACT OF MINUTES OF MEETINGS.
Seventeenth (9th Annual), New York, April 29th, 1897 ... 106
Eighteenth, Springfield, Mass., October 7th and 8th, 1897 ... 186
Nineteenth (10th Annual), New York, April 28th and 29th, 1898 ... 274
Twentieth, Worcester, Mass., October 6th and 7th, 1898 ... 360

ACKLAND (Thomas Gans). Elected Member ... 365

ACTUARIAL CONGRESSES, INTERNATIONAL, CONSTITUTION AND BY-LAWS OF PERMANENT COMMITTEE OF ... 101

ACTUARIAL PROFESSION AS A MEANS OF LIVELIHOOD. Address of President McClintock ... 74

ACTUARIAL SOCIETY OF AMERICA, DECENNIAL OF FOUNDING OF, TO BE CELEBRATED MAY 18TH, 1899 ... 365

ACTUARIES, SECOND INTERNATIONAL CONGRESS OF, LONDON, 1898.
Invitation to ... 99
Delegates to the ... 277
Particulars as to Membership in ... 100
Officers and Members of ... 367
Acta of ... 374
Third International Congress, 1901. Invitation to Hold Meeting in New York City ... 277

ADDRESSES OF PRESIDENT.
Emory McClintock ... 74
Bloomfield J. Miller ... 186, 274, 360
Discussion of ... 97, 176, 267, 274

ADMISSION OF ASSOCIATES ... 192, 276

AN EQUITABLE METHOD OF DETERMINING PAID-UP OR CASH SURRENDER VALUES. David Parks Fackler ... 303

ANGELL (Chas. H.). Admitted as an Associate ... 192

ANNUAL MEETING, DATE OF, CHANGED TO MAY ... 366

ANNUITANTS, MORTALITY PREVAILING AMONG. Thomas B. Macaulay. (Vol. IV., page 410.)
Discussion of ... 93

ANNUITIES, VALUATION OF REVERSIONARY, BY C COLUMNS. Maximilian H. Peiler ... 314

ARENA, THE, NEW YORK, DINNER AT ... 278

ASSOCIATES, ADMISSION OF ... 192, 276

BASIS OF PREMIUM RATES, SELECT LIFE TABLES AS THE. Thomas Bradshaw ... 225
Discussion of ... 346

BRADSHAW (Thomas).
Select Life Tables as the Basis of Premium Rates ... 225
Tables I., II., III. and IV. (omitted from above) ... 306

BURRIDGE (Arthur Francis). Elected Member ... 365

BY-LAWS ... 272, 358
Amended ... 192, 277

CASH SURRENDER VALUES, AN EQUITABLE METHOD OF DETERMINING PAID-UP OR. David Parks Fackler ... 303

CHANGE IN DATE OF ANNUAL MEETINGS ... 366

COCKBURN (Henry). Elected Member ... 365

PAGE

COINAGE OF SILVER DOLLARS OF THE PRESENT WEIGHT.
Address of President McClintock (Vol. IV., page 472), Discussion of... 97

COMMITTEE OF INTERNATIONAL CONGRESSES, CONSTITUTION AND BY-LAWS OF THE PERMANENT 101

CONGRESS OF ACTUARIES, SECOND INTERNATIONAL, LONDON, 1898.
Invitation to 99
Delegates to the 277
Particulars as to Membership in 100
Officers and Members of 367
Acta of 374
Third International Congress, 1901, Invitation to Hold Meeting in New York City 277

CONSTITUTION AND BY-LAWS OF THE PERMANENT COMMITTEE OF INTERNATIONAL ACTUARIAL CONGRESSES 101

CONSTITUTION OF ACTUARIAL SOCIETY OF AMERICA 270, 356
Amended 366

CONTENTS OF NOS. 17, 18, 19 AND 20 3

CORRIGENDA 8

COSMAO-DUMANOIR (Edmond A.). Minutes. Picture 382, 395

COST OF INSURANCE.
James M. Craig 31
Morris W. Torrey 140
Discussion of 170, 261

COUNCIL, ELECTION OF 107, 277

COUNCIL, OFFICERS AND MEMBERS OF THE SOCIETY 4–8

CRAIG (James M.). Cost of Insurance 31
Remarks 172, 264, 325

CRAWFORD (James C.). Remarks 333

DATE OF ANNUAL MEETINGS CHANGED 366

DEATHS, MINUTES CONCERNING 379
Samuel N. Stebbins 381
Edward B. Smith 381
Edmond Auguste Cosmao-Dumanoir 382
Horace C. Richardson 383
Chas. B. Perry 383
Léon Mahillon 384
Jacques N. Martin-Dupray 194, 385
Sheppard Homans 280, 385
Henry W. Smith 282, 387
George Ellis 367, 387
Joseph H. Sprague 368, 388
George W. Phillips 369, 389

DE BOER (Joseph A.). Level Premium Life Insurance. Historical Note... 49

DECEASED MEMBERS, PICTURES OF. MINUTES CONCERNING 379, 391

DECENNIAL OF FOUNDING OF ACTUARIAL SOCIETY OF AMERICA TO BE CELEBRATED MAY 18TH, 1899 365

DELEGATES TO THE SECOND INTERNATIONAL CONGRESS OF ACTUARIES 277

DEUCHAR (David). Elected Member 365

DE WITT (Johan), LIFE OF. Translation by Ernst W. Scott 147

DINNER—
Seventeenth, New York, April, 1897 108
Eighteenth, Springfield, Mass., October, 1897 192
Nineteenth, New York, April, 1898 278
Twentieth, Worcester, Mass., October, 1898 366

PAGE

Distribution of Expenses, Provision for and. William D. Whiting... 214
Discussion of... 318

Election of Members... 107, 191, 365
Of Officers... 107, 277
Of Council... 107, 277
Of Associates... 192, 276

Ellis (George), Minutes Concerning Death of. Picture... 367, 387, 409

Equity in Life Insurance, The Province of. Walter S. Nichols... 117
Discussion of... 245

Examinations of other Actuarial Institutes or Societies, Motion to Accept... 366

Expenses, Provision for and Distribution of. William D. Whiting... 214
Discussion of... 318

Fackler (D. Parks). Remarks... 164, 171, 172, 330
An Equitable Method of Determining Paid-up or Cash Surrender Values. 303

Founding of the Actuarial Society of America, Decennial of the, to be Celebrated May 18th, 1899... 365

Frankland (Frederick W.). Remarks... 242

General Principles. (Part of address before National Insurance Convention, Milwaukee, 1898.) Emory McClintock... 283

Gore (John K.). Remarks... 93, 245

Government Legislation of Holland in Reference to the Working of Life Insurance Companies. Leonard Wolterbeek... 67

Hall (Clayton C.). What Constitutes an Insurable Interest in Lives... 9
Remarks... 95, 253

Hall (Samuel S.). Admitted as an Associate... 192
Market Value of Government Bond (Tables)... 312

Hemperley (Francis H.). Remarks... 174

Hendriks (Augustus). Elected Member... 365

Hendry (William). Remarks... 173

Higham (Charles D.). Elected Member... 365

Hildebrand (Charles). Remarks... 349

Historical Note. Level Premium Life Insurance. Joseph A. De Boer. 49
Discussion of... 173

Hitchins (William R.). Admitted as an Associate... 276

Holcombe (John M.). The Ideal Life Insurance Company... 222

Holland, in Reference to the Working of Life Insurance Companies, Government Legislation of. Leonard Wolterbeek... 67

Homans (Sheppard). Remarks... 89
Letters regarding death of... 278
Minutes concerning death of. Picture... 280, 385, 405

Hughes (William). Elected Member... 365

Huntington (Robert W.). Remarks... 82

Ideal Life Insurance Company, The. John M. Holcombe... 222

Imperial Hotel, New York City, Dinner at... 108

Individualism *vs.* Communism in the Conduct of a Life Insurance Company. Archibald A. Welch... 300

Instalments, Note on a Particular Case of Loans Repayable by. John Tatlock, Jr... 114
Discussion of... 242

PAGE

INSURABLE INTEREST IN LIVES, WHAT CONSTITUTES AN.
Clayton C. Hall ... 9
Discussion of ... 152

INSURANCE COMPANY, THE IDEAL LIFE. John M. Holcombe ... 222

INSURANCE, COST OF.
James M. Craig ... 31
Morris W. Torrey ... 140
Discussion of ... 170, 261

INSURANCE, LEVEL PREMIUM LIFE, HISTORICAL NOTE.
Joseph A. De Boer ... 49
Discussion of ... 173

INSURANCE, THE PROVINCE OF EQUITY IN LIFE. Walter S. Nichols ... 117
Discussion of ... 245

INSURANCE VALUES AS BASES FOR SURRENDER CHARGES. Sheppard Homans.
(Vol. IV., page 381.) Discussion of ... 82

INTERNATIONAL ACTUARIAL CONGRESSES, CONSTITUTION AND BY-LAWS OF THE PERMANENT COMMITTEE OF ... 101

INTERNATIONAL CONGRESS OF ACTUARIES, SECOND, LONDON, 1898.
Invitation to ... 99
Delegates to ... 277
Particulars as to Membership of ... 100
Officers and Members of ... 367
Acta of ... 374
THIRD, 1901, Invitation to Hold Meeting in New York City ... 277

IRELAND (Oscar B.). Remarks ... 183
Appointed Committee to prepare Abstract on War Risks ... 279

JOHAN DE WITT, LIFE OF. Translation by Ernst Willem Scott ... 147

KAUFMAN (Henry N.). Admitted as an Associate ... 276

LEE (James M.). Remarks ... 156, 253

LEGAL RATIO OF 15½, NOTE UPON THE. (In Coinage of Silver.)
Léon Walras. Translation by Rufus W. Weeks ... 61
Discussion of ... 175

LEGISLATION OF HOLLAND IN REFERENCE TO THE WORKING OF LIFE INSURANCE COMPANIES, GOVERNMENT. Leonard Wolterbeek ... 67

LEPREUX (Omer). Election of ... 191

LEVEL PREMIUM LIFE INSURANCE. Historical Note. Joseph A. De Boer ... 49
Discussion of ... 173

LEWIS (Charlton T.). Remarks ... 92

LIFE INSURANCE COMPANIES, GOVERNMENT LEGISLATION OF HOLLAND IN REFERENCE TO THE WORKING OF. Leonard Wolterbeek ... 67

LIFE INSURANCE COMPANY, INDIVIDUALISM *vs.* COMMUNISM IN THE CONDUCT OF A. Archibald A. Welch ... 300

LIFE INSURANCE COMPANY, THE IDEAL. John M. Holcombe ... 222

LIFE INSURANCE, LEVEL PREMIUM, HISTORICAL NOTE.
Joseph A. De Boer ... 49
Discussion of ... 173

LIFE TABLE, MEECH'S. Howell W. St. John ... 25
Discussion of ... 167

LIMITATIONS OF THE SYSTEM OF NET VALUATIONS, THE.
Walter S. Nichols ... 195

LIST OF OFFICERS, COUNCIL AND MEMBERS OF THE SOCIETY ... 4–8

LIVELIHOOD, ACTUARIAL PROFESSION AS A MEANS OF. Address of President McClintock ... 74

PAGE

LIVES, WHAT CONSTITUTES AN INSURABLE INTEREST IN.
Clayton C. Hall ... 9
Discussion of ... 152

LOADING, NOTE ON PREMIUM. Walter C. Wright ... 129
Discussion of ... 255

LOANS REPAYABLE BY INSTALMENTS, NOTE ON A PARTICULAR CASE OF.
John Tatlock, Jr ... 114
Discussion of ... 242

LUNCHEON—
Metropolitan Life Insurance Company, New York, April, 1897 ... 107
Mt. Tom, Mass., October, 1897 ... 193

LUNGER (John B.). Remarks ... 176

MACAULAY (Thomas B.).
Remarks ... 88, 96, 152, 156, 158, 164, 166, 167, 180, 251, 254, 331
Delegate to Second International Congress of Actuaries ... 277

MCCLINTOCK (Emory). Address ... 74
Remarks ... 162, 185
Delegate to Second International Congress of Actuaries ... 277
General Principles (Part of Address before National Insurance Convention, Milwaukee, 1898) ... 283

MCCLINTOCK'S FORMULA FOR AN APPROXIMATION OF ACCUMULATED CONTRIBUTION TO SURPLUS, MODIFICATION OF. Gardner Ladd Plumley ... 310

MACDONALD (Wm. C.). Remarks ... 246

MAHILLON (Léon), MINUTES CONCERNING DEATH OF. Picture ... 384, 401

MARKET VALUE OF $100 GOVERNMENT 3 PER CENT. BOND, ISSUE OF AUGUST 1ST, 1898. Samuel S. Hall ... 312

MARSHALL (Elbert P.). The Tendency to National Supervision ... 109
Discussion of ... 239

MARTIN-DUPRAY (Jacques N.), MINUTES CONCERNING DEATH OF.
Picture ... 194, 385, 403

MASSACHUSETTS MUTUAL LIFE INSURANCE COMPANY, VOTE OF THANKS TO ... 193

MASSASOIT HOUSE, SPRINGFIELD, MASS., DINNER AT ... 192

MEECH'S LIFE TABLE. Howell W. St. John ... 25
Discussion of ... 167

MEETINGS—
Seventeenth (9th Annual), New York, April 29th, 1897 ... 106
Eighteenth, Springfield, Mass., October 7th and 8th, 1897 ... 186
Nineteenth (10th Annual), New York, April 28th and 29th, 1898 ... 274
Twentieth, Worcester, Mass., October 6th and 7th, 1898 ... 360

MEMBERS, DECEASED, MINUTES CONCERNING ... 379

MEMBERS, ELECTION OF ... 107, 191, 365
Admission of Associates ... 192, 276

MEMBERSHIP OF THE SECOND INTERNATIONAL CONGRESS OF ACTUARIES, PARTICULARS AS TO ... 100

MEMBERS OF THE SOCIETY ... 4-8

METROPOLITAN LIFE INSURANCE COMPANY, VOTE OF THANKS TO ... 108

MILLER (Bloomfield J.). Addresses ... 186, 274, 360
Remarks ... 156, 157, 165, 252, 335

MINUTES CONCERNING DEATH OF ... 379
Samuel N. Stebbins ... 381
Edward B. Smith ... 381
Edmond-Auguste Cosmao-Dumanoir ... 382
Horace C. Richardson ... 383
Chas. B. Perry ... 383

PAGE

Léon Mahillon 384
Jacques N. Martin-Dupray 194, 385
Sheppard Homans 280, 385
Henry W. Smith 282, 387
George Ellis 367, 387
Joseph H. Sprague 368, 388
George W. Phillips 369, 389

Modification of Mr. McClintock's Formula for an Approximation of Accumulated Contribution to Surplus. Gardner Ladd Plumley.... 310

Money, Problem of the Value of. Léon Walras. Translation by Rufus W. Weeks 132

Mortality Prevailing among Annuitants. Thomas B. Macaulay (Vol. IV., page 410).
Discussion of 93

Mt. Tom, Mass., Luncheon at 193

National Supervision, The Tendency to. Elbert P. Marshall 109
Discussion of 239

Net Valuations, The Limitations of the System of. Walter S. Nichols 195

New York Meeting. April 29th, 1897 106
April 28th and 29th, 1898 274

Nichols (Walter S.). The Province of Equity in Life Insurance 117
The Limitations of the System of Net Valuations 195
Remarks 158, 319

Notation 8

Note on a Particular Case of Loans Repayable by Instalments. John Tatlock, Jr. 114
Discussion of 242

Note on Premium Loading. Walter C. Wright 129
Discussion of 255, 341

Note upon the Legal Ratio of 15½ (In Coinage of Silver). Léon Walras 61
Discussion of 175

Officers and Council of the Second International Congress of Actuaries, London, 1898 104

Officers, Council and Members of the Society 4–8

Officers, Election of 107, 277

Paid-up or Cash Surrender Values, An Equitable Method of Determining. David Parks Fackler 303

Peiler (Max. H.). Valuation of Reversionary Annuities by C Columns... 314

Perry (Charles B.), Minutes Concerning Death of. Picture.....383, 399

Phillips (George W.), Minutes Concerning Death of. Picture..369, 389, 413

Pictures of Deceased Members 391

Pierson (Israel C.). Delegate to Second International Congress of Actuaries 277

Premium Loading, Note on. Walter C. Wright 129
Discussion of 255

Premium Rates, Select Life Tables as the Basis of.
Thomas Bradshaw 225
Discussion of 346

President's Addresses—
Emory McClintock 74
Bloomfield J. Miller 186, 274, 360
Discussion of 97, 176, 267

Problem of the Value of Money. Léon Walras 132

PAGE

PROVINCE OF EQUITY IN LIFE INSURANCE, THE. Walter S. Nichols..... 117
Discussion of..... 245

PROVISION FOR AND DISTRIBUTION OF EXPENSES. William D. Whiting..... 214
Discussion of..... 318

RATIO OF 15½, NOTE UPON THE LEGAL OF (In Coinage of Silver), LÉON WALRAS..... 61
Discussion of..... 175

RESOLUTION OF SYMPATHY TO PRESIDENT MCCLINTOCK..... 106

RESOLUTION OF THANKS TO
Massachusetts Mutual Life Insurance Company..... 193
Metropolitan Life Insurance Company..... 108
State Mutual Life Insurance Company..... 366

RESOLUTION TO PURCHASE MR. JOSEPH H. SPRAGUE'S BOOK..... 366

RICHARDSON (Horace C.), MINUTES CONCERNING DEATH OF. Picture...383, 397

ROACH (John F.). Admitted as an Associate..... 376

ROSE (Douglas H.). Admitted as an Associate..... 192

ST. JOHN (Howell W.). Meech's Life Table..... 25
Translation of Note upon the Legal Ratio of 15½ (In Coinage of Silver), by Léon Walras..... 61
Remarks..... 169, 351

SALTER (George F.). Remarks..... 346

SANDERSON (Frank). Remarks..... 167

SARTELLE (Edward J.). Remarks..... 96

SCOTT (Ernst W.). Translation of Life of Johan de Witt..... 147

SECOND INTERNATIONAL CONGRESS OF ACTUARIES, LONDON, 1898..... 99
Letter to Secretary Pierson from Committee of..... 277
Delegates Selected..... 367
Officers and Members of..... 367
Acta of..... 374

SELECT LIFE TABLES AS THE BASIS OF PREMIUM RATES. Thomas Bradshaw. 225
Tables I., II., III. and IV. (omitted from above)..... 306
Discussion of..... 346

SILVER, COINAGE OF, NOTE UPON THE LEGAL RATIO OF 15½ IN. Léon Walras..... 61

SILVER DOLLARS OF THE PRESENT WEIGHT, COINAGE OF. Address of President McClintock. (Vol. IV., page 472.) Discussion of..... 97

SMITH (Edward B.), MINUTES CONCERNING DEATH OF. Picture.....381, 393

SMITH (Henry W.), MINUTES CONCERNING DEATH OF. Picture.....282, 387, 407

SOCIETY OF AMERICA, ACTUARIAL, DECENNIAL OF FOUNDING OF, TO BE CELEBRATED MAY 18TH, 1899..... 365

SPRAGUE (Joseph H.). Remarks..... 85
Death of. Minutes. Picture.....368, 388, 411
Book—Resolution to Purchase, for A. S. A. Library..... 366

SPRINGFIELD, MASS., MEETING. October 7th and 8th, 1897..... 186

STABLER (Edward L.). Remarks..... 97
Reappointed Assistant Editor of the Papers and Transactions..... 108

STARR (William E.). Remarks.....88, 255

STATE MUTUAL LIFE ASSURANCE CO., INVITATION OF..... 277

STEBBINS, SAMUEL N., MINUTES CONCERNING DEATH OF. Picture.....381, 391

SUPERVISION, THE TENDENCY TO NATIONAL. Elbert P. Marshall..... 109
Discussion of..... 239

PAGE

SURRENDER CHARGES, INSURANCE VALUES AS BASES FOR. (Sheppard Homans, Vol. IV., page 381). Discussion of 82

SYSTEM OF NET VALUATIONS, THE LIMITATIONS OF THE. Walter S. Nichols. 195

TABLE, MEECH'S LIFE. Howell W. St. John 25
Discussion of. 167

TABLES AS THE BASIS OF PREMIUM RATES, SELECT LIFE. Thomas Bradshaw. 225
Tables omitted from above 306
Discussion of 346

TABLES OF MARKET VALUES OF GOVERNMENT BONDS. Samuel S. Hall 312

TATLOCK (John, Jr.). Note on a Particular Case of Loans Repayable by Instalments 114
Remarks. 175

TENDENCY TO NATIONAL SUPERVISION, THE. Elbert P. Marshall 109
Discussion of 239

THE LIMITATIONS OF THE SYSTEM OF NET VALUATIONS. Walter S. Nichols. 195

THE PROVINCE OF EQUITY IN LIFE INSURANCE. Walter S. Nichols 117
Discussion of. 245

TORREY (Morris W.). Cost of Insurance 140
Discussion of 261

VALUATION OF REVERSIONARY ANNUITIES BY C COLUMNS. Max. H. Peiler .. 314

VALUATIONS, THE LIMITATIONS OF THE SYSTEM OF NET. Walter S. Nichols 195

VALUE OF MONEY, PROBLEM OF THE. Léon Walras 132

VAN CISE (Joel G.). Remarks 267

WALRAS (Léon). Note upon the Legal Ratio of 15½. (In Coinage of Silver) 61
Problem of the Value of Money 132

WAR RISKS. Discussed at Nineteenth Dinner, April, 1898 278
Appointment of Committee on 279

WEEKS (Rufus W.). Delegate to Second International Congress of Actuaries 277
Translation of "Problem of the Value of Money." Léon Walras 132

WELCH (Archibald A.). Individualism *vs.* Communism in the Conduct of a Life Insurance Company 300

WELLS (Daniel H.). Remarks 166, 167, 326

WHAT CONSTITUTES AN INSURABLE INTEREST IN LIVES. Clayton C. Hall ... 9
Discussion of 152

WHITING (William D.). Provision for and Distribution of Expenses 214
Remarks 156, 182, 239, 249, 254, 318, 336
Delegate to Second International Congress of Actuaries 277

WHITTALL (William Joseph Hutchings). Elected Member 365

WING (Asa S.). Remarks 256

WOLTERBEEK (Leonard). Government Legislation of Holland in Reference to the Working of Life Insurance Companies 67

WOOD (Arthur B.). Admitted as an Associate 276

WOODS (Ernest). Elected Member 365

WORCESTER, MASS., MEETING. October 6th and 7th, 1898 360

WRIGHT (Peter T.). Remarks 261

WRIGHT (Walter C.). Note on Premium Loading 129
Remarks 170, 172, 336, 341

WYATT (Frank Bertrand). Elected Member 365

YOUNG (Thomas E.). Election of 107

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